Ministry of Agriculture

Sudan Government

A DIETARY SURVEY AMONG THE ZANDE OF THE SOUTH-WESTERN SUDAN

By G. M. CULWICK

With

A CLINICAL NOTE

By

P. H. ABBOTT, M.B., B.Chir.,

Sudan Medical Service

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ULTURAL PUBLICATIONS COMMITTEE

KHARTOUM

1950

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Dietary survey

Call No. 2 132.678 N60

Page No.	Date of Issue	Date of Return
125	10-5-55	11.5.55

1583

1. dietary
2. food treatment
3. fruits
4. vegetables
5. cooking
6. feeding
7. food consumption
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[SUBMITTED FOR PUBLICATION MARCH 1949]

PRINTED BY WHITEHEAD MORRIS EGYPT

1583
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L ; 32.678 N 50
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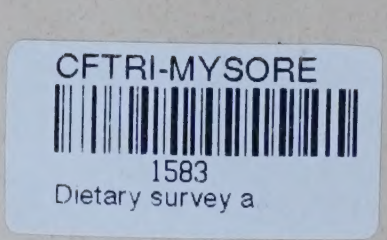

A DIETARY SURVEY AMONG THE ZANDE OF THE SOUTH-WESTERN SUDAN

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A Survey of Signs of Nutritional Ill-Health among the Zande of the Southern Sudan
by P. H. ABBOTT, M. B. B., Chir.,
Sudan Medical Service.
(Pages 157 to 167)

I.—SUMMARY AND CONCLUSIONS

DIETARY

1. The main dietary conclusions are as follows :—

1. *Quantity*: The peasant diet and that of some categories of wage-earners is geared to a slow rate of living with a low output of energy. Development entails raising output; this will require an increase in the total amount of food consumed and will create a demand for it by reason of enhanced hunger, with consequent pressure on the existing subsistence food economy. This is already happening.

Paras. 10, 90ff., 290ff., 314ff.

2. *The Protein-Carbohydrate Ratio* is too low for safety. There are several ways of improving the position :—

(*a*) increased consumption of foods with a high protein-carbohydrate ratio, such as animal products, pulses and oilseeds ;

(*b*) increased consumption of fat (as oil or in oilseeds) in place of carbohydrate ;

(*c*) reduction of the proportion of cassava in the diet by replacement with any grain. In this respect, any grain is more useful than eleusine (but the latter is important in maintaining calcium intake at a satisfactory level).

The present imbalance could easily be aggravated, *e.g.* by selling groundnuts and making up on cassava. or by raising the energy value of the diet by additional carbohydrate, *e.g.* sugar, whether local brown or imported white, or by still further increasing the consumption of cassava.

Paras. 250, 302.

3. *Riboflavin* : Clinical evidence shows a slight shortfall below requirements, though nothing like as serious as the dietary findings suggest. Dried cassava is the enemy here, contributing none. Pulses, oilseeds, animal products and leafy vegetables are the best sources, but cereals, fresh roots and fruits can all make useful contributions. Here again, other cereals are to be preferred before eleusine. Processing can be a valuable aid : soaking and souring, fermentation (not necessarily for the production of alcoholic beverages). Yeast is a more sophisticated means to the same end, more appropriate to large-scale handling of food, *e.g.* communal feeding, bulk production of flour, manufactured foods like biscuits.

Paras. 283ff., 311.

4. *Vitamin A* : Vitamin A is short for most of the dry season because the richest sources then easily obtainable are unpopular and only sparingly eaten. Intake is high in the rainy season owing to the popularity of the leafy vegetables of that season, and the absence of deficiency signs suggests that enough is taken then to carry the people over till the mangoes come in. The present contribution of sweet potatoes is problematical ; the use of suitable varieties would safeguard the position in the dry season.

Paras. 262, 307.

5. *Other Nutrients*: The other nutrients evaluated were found to be adequately supplied. Comments will be found in Section XI.

6. *Cassava* has a valuable rôle to play as a supplementary food and famine reserve, but it has encroached beyond those limits, is ousting cereals, and unless checked, threatens to undermine the whole nutritional position. Its attraction lies as much in its low processing costs as in its ease of cultivation.

Paras. 103, 111, 121, 167ff., 213ff., 252ff.

7. *Stress Period*: There is a marked stress period in April-May, when the hardest work coincides with the lowest energy intake, and people lose weight and feel overburdened. The low intake was not found to be due to scarcity of basic foods, except in families which were opening up a new homestead at too great a distance from the old one to make much use of the cassava left there, or whose cassava in the old home had suffered through pigs and had run out before the new had come into bearing. The principal cause was a clash of field and domestic duties, especially in small households, the women being too tired to grind and cook, and of course the less they ate, the tireder they got. Families were filling themselves up on mangoes, and reducing domestic chores to a minimum. This situation could be at least partly alleviated by forethought and the prior preparation of a stock of flour. Experiment showed that eleusine flour keeps well for several months even in wet weather. Cassava flour was not tested, but the dried lumps, which require very little further work, keep sufficiently well to cover this period and a stock could be made ready in that form. The tedium of preparing a lot of flour at once could be mitigated by a series of working parties, a device already familiar for agricultural purposes.

Paras. 97, 203, 265ff., 292.

WAGE-EARNING

2. Wage-earning affects the diet for both good and ill, according to circumstances. In so far as it tears a man out of his family background, *e.g.* casual labour, a moving job, or one subject to constant and unpredictable transfers, it leads to a most unstable manner of living and haphazard feeding, mitigated or aggravated by individual character and circumstances. In so far as it is compatible with family life, is combined with some degree of education and good sense, and adds the advantages of purchasing power to a measure of home production (at least on a garden scale to provide important supplementary items), it can greatly improve the standard of living from the dietary as well as from other points of view. Character and the nature and extent of family obligations determine where between the two extremes any particular family will find itself, but broadly the lower wage groups tend towards the first unstable type and *vice versa*.

Paras. 58, 68, 115, 209-210, 219, 249, 252, 269, 296, 299, 301, 315ff.

EXPENDITURE ON FOOD

3. At the prices ruling in Yambio early in 1948, a reasonable estimate for food expenditure in the highest wage grades, with generally

more sophisticated but not unduly extravagant tastes, would be 50-60 P.T.[1] per head per month, assuming no basic supplies are home-grown and excluding any expenditure on maintaining a vegetable garden or on beer. This last could be anything from 0 to well over 100 P.T. per household per month.

4. A sample budget for a family maintaining more traditional patterns of feeding, but at a level allowing the margin required to raise output above the slow peasant rate of living, has been founded on the police families' records, assuming all basic foods to be purchased and only supplementary items to be home-grown. At the Yambio price level of early 1948, expenditure on such a diet at 2,500 calories per head per day comes out at 33 P.T. per head per month. Expenditure on beer is again subject to wide variation, but 25-30 P.T. for husband and wife for the month appeared to be common ; on the price ranges given in para. 229, this may be taken as an average of half a litre a day for each. Firewood, abundant in the rural homesteads, is a more difficult matter for the wage-earning family in a station. In Yambio in 1948 for a family buying the whole of its essential fuel needs, the cost would be at least 10 P.T. per month ; the alternative was to fetch it from outside the town at a time-cost of two hours for a load lasting two days.

RESETTLEMENT

5. The immediate nutritional effects of resettlement seem to be a hard, lean year followed by an easy, fat one. In addition to obvious things like pressure of new clearing and building in the first year, the introduction of cotton in the very first year adds to the hardship of the removal ; clearing for it, coming at what is anyway the point of heaviest pressure (see para. 1 (6) above), means that less land than usual is cleared in time for double-cropping with food crops. To introduce cotton in the second year would spread the physical burden of resettlement, but taking two bites at the cherry might have disadvantages of other kinds. After its first year, cotton encourages increased production of groundnuts and a larger proportion of land double-cropped, because the old cotton plots are clean and ready at the onset of the rains. The nett increase in production may not be as great as it seems at first sight, for adjustments elsewhere probably partly offset it. The production of measured plots of specified food crops for sale instead of cotton may react differently on the subsistence agriculture.

6. The third year should presumably see things shaking down into some sort of established pattern incorporating the new cash crops. In the southern areas, with a 27-month staple cassava, it is only in this year that the cassava rotation will be re-established, and during the first part of the cultivation season there may well be a shortage. In the first year all cassava bitter or sweet is in the old home. By the second year, sweet cassava is ready in the new homes, but the bitter has to come from the old. With the help of the wild pigs, the supply

[1] 10-12 shillings.

may not last out till the plantings in the new settlement come into production towards the end of the third rainy season. In the northern sub-district with a 15-month staple, the rotation will be re-established in the second year.

Paras. 59, 61, 65-6, 97ff., 214, 237-8, 246-7, 293-4.

7. The long-term effects of resettlement on nutrition can hardly be gauged as yet. Theoretically, it is intended to lead to permanent homesteads in which fruit trees and other long-term amenities can be developed, as well as to improved methods of agriculture resulting, presumably, in increased productivity. In the first, it has to contend with the forces which impel the Zande to migrate, and the fight must be a hard one because these customs are rooted not in reason but in psychological fears unamenable either to reasoning or to Government regulations. The second intention has to contend with Zande inertia and low energy output as well as all the frustrations arising from inadequate staff.

8. Some more general considerations are touched on in para. 12.

Paras. 23ff., 35ff., 54, 121.

FACTORS INVOLVED IN THE IMPROVEMENT OF FEEDING

9. The improvement of feeding cannot be considered *in vacuo*, but only as a part of the process of raising the whole standard of living. Foods and feeding are tied in at innumerable points to the social and economic fabric and the problems involved in improvement can only be tackled if their relationships are understood. Prescribing a new food will not get it cultivated or, even if cultivated, eaten. The first involves, besides technical cultural considerations, study of the human aspect of its cultivation-costs and of its domestic implications in relation to existing claims on the women's time. The second requires :—

(*a*) the realisation that innovations have to get across as appetising food, not as chemical compounds which are good for you ;

(*b*) an experimental kitchen directed by a resourceful imagination as part and parcel of the work of the Research Farm ;

(*c*) some definite channels for demonstration and the propagation of ideas.

Both depend on solving the psychological problem of evoking interest.

I think the possibilities of institutional feeding for practical food education are limited to schools, and there only if there is a woman with time to give to it. Hospital feeding has no bearing, in the victim's mind, on everyday life ; it is simply part of a largely incomprehensible regime to which he is subjected when sick. The same goes for prison feeding for a rather different reason—it is part of the punishment.

10. Development, whether considered in its purely economic aspect or in a wider sense to include education, general welfare and

social considerations, demands more time and trouble and energy output—it simply is not possible within a pattern of life geared down, as to both output and intake, to the present rate of living of the Zande peasant. A growing pressure on food supplies is creating supply difficulties for both institutions and individual purchasers, and I do not think it is wholly attributable to competition from external markets like Wau and Juba. An internal factor in more senses than one) will be increasingly felt as development expands and can be very simply described—busier people mean hungrier mouths.

11. The labour costs of food production include processing and domestic costs as well as cultivation. These may well be limiting factors unless some degree of specialisation and simple mechanisation replaces the extravagantly time-costly and energy-costly methods of the primitive peasant. The most obvious example is the production of cereal flours (satisfactory as to both physical properties and nutritional value) to compete with the encroachments of cassava. This is not only a matter of large-scale production for labour institutions; it is equally a domestic problem and should be a village problem if such a unit as a village existed in Zande rural life. It is difficult to see how the standard of rural living is to be raised unless something akin to a village, with its territorial cohesion and cooperative specialisation of skills, develops in the social structure. It seems to be an essential phase. It would require the circulation of money, but that is not at all an impossible condition, for already the economy is half based on money, which comes in for chillies, honey and through the wage-earners. Much of it goes straight out again, but much also is hidden away, and it could do useful work in the community by circulating internally in a partly specialised village economy.

12. At first sight, it would seem that the new settlements could be a step towards this, but in fact they string the population out so widely in long lines that they give more encouragement to the Zande passion for domestic isolation than the old roadside settlements. Whether the territorial unit of the *gbaria* or line could nevertheless become the starting-point for the development of corporate interests and a sense of community it is impossible to say.

CONSUMPTION TARGET
(Immediate)

13. A reasonable consumption target for immediate purposes can be stated, in the light of the survey data, in terms of the traditional feeding pattern, and for practical reasons this is given in preference to anything more ambitious. It may serve as a first step, a basic pattern on to which dietary innovations may be grafted to improve both nutritional value and consumer interest. It is intended for a *mixed* population considered on a per head basis, and would not be adequate, for instance, for a group composed entirely of adults doing hard work. The feeding of institutions has been dealt with in a previous report to the Committee, this one is concerned with the general population.

Category of Food	*Tons per 1,000 Mixed Population per Month*	*Nett g. per Head per Day*
Grains, various, unprocessed ..	8.8	250
Cassava, dry lumps	6.7	200
Cassava, fresh, gross ..... *or* Sweet potatoes, fresh, gross .	3.8 / 4.6	100
Oilseeds :—		
Groundnuts, in shell	3.8	90
Sesame.....	0.5	15
Other, gross	0.5	10
Dried meat *or* dried fish *or* pulses, edible portion (1).....	0.9	30

Supplementary Foods: Yams, bananas, leafy and other vegetables fruits, honey.

14. This, without the supplementary foods, would provide approximately 2,400 calories and 53 g. protein per head per day, with adequate amounts of minerals and B vitamins (2). Vitamins A and C would depend as now on ringing the changes seasonally on leafy vegetables, fresh roots (including coloured varieties of sweet potatoes) and fruits. What it means in terms of acreages and tonnage at field depends on yields and losses between field and kitchen door. Waste incurred between the state indicated in the schedule and actual consumption, *i.e.* in preparation and as pot waste, has been allowed for in calculating the final column of g. per head per day.

II.—BACKGROUND TO THE SURVEY

GENERAL

15. The people selected for the study were the Zande and the associated groups living in the Zande District of the Anglo-Egyptian Sudan, that is, along the eastern side of the Nile-Congo Divide in the south-western corner of the country(3). The area borders on the Belgian Congo and French Equatorial Africa, and the majority of the tribe live in those countries. The choice was made partly because the information would be useful to the Sudan Government's Zande Development Scheme, and partly because the food economy of a people better off than their neighbours in respect of quantity and variety through the year, but having practically no animal products, seemed likely to yield information of general interest.

(1) *i.e.* pulses shelled ; meat or fish, without making any allowance for inedible waste which varies with the type of product.

(2) Unless destructive and wasteful methods of treatment are adopted, and subject to what is said in para. 1 (3) about riboflavin and paras. 256 and 305 about calcium.

(3) Roughly 5° N and 30° W.

16. The Equatoria Handbook (viii) gives the Zande area (in the Sudan) as 21,345 sq. miles, with a population of 185,043, an overall density of 8.7 per sq. mile; but the population follows the best land and is heaviest in the southern half of the area, being sparse to the north and west. The population with which the survey was concerned amounted to roughly 104,000 people; see Table 3. Owing to their remoteness from the outside world, development plans have been founded on the production and local processing of commodities for the markets of the Southern Sudan. Cotton grown by the peasants is to be ginned, spun and woven on a small factory scale; the spinning and weaving machinery had not yet arrived at the time of the survey and for the time being the cotton crop was being exported as lint. A small sugar plantation and factory was turning out crude brown sugar; there was talk of oil and soap production; tobacco-curing was being tried on an experimental scale; and a little coffee was being grown. Industrial activities were to be concentrated some miles from the district headquarters at Yambio, and the site was in process of development.

PHYSICAL ENVIRONMENT

17. The country is undulating, tedious to the traveller hemmed in by walls of exuberant vegetation, with few glimpses of a wider landscape to break the monotony. Most of it is high-grass woodland or, particularly in the north, medium-grass woodland. A network of streams coming off the watershed ensures that nobody has far to go for water, and the soils are lateritic, red and acid, varying from deep red loams of good water-holding capacity to light shallow soils full of ironstone pebbles and of poor water-holding capacity (xi). The underlying rocks are mainly gneisses and granites overlain by ironstone. It is all tsetse country, so the people own no cattle and practically no small stock.

18. Climatic information from two meteorological stations in the district will be found in Table 1. It will be seen that while some rain falls in every month, the rainy season is from March to November. The total is about the same at both stations (Yambio 1,429 mm. and Yubu 1,424 mm.), but there is a tendency towards a greater concentration of the fall at Yubu, where it is somewhat drier in the dry season and wetter in the wet. The curve rises rather more slowly in the early rains and tails off more sharply after September. This tendency, which is distinctly seen if the figures be drawn out as curves, becomes more pronounced further north still, and beyond Tambura there is a wholly rainless and longer dry season. At the survey's Bo Road sample, 100 miles north of Tambura, rain did not fall nor did the termites fly in 1948 until April, this being apparently regarded as perfectly normal. Similarly it seems that the rainy season ends more abruptly in that area, but this was difficult to judge in a year in which the rains were curtailed everywhere in the district. The opinion expressed to me that the total rainfall is as great in the north of the district as in the south may be correct, but there is a difference in distribution which greatly influences the life of the people.

19. The rainfall of the twelve months of the survey (July 1947 to June 1948) was unusual in distribution in that the rainy season of 1947 ended early and that of 1948 was a slow starter. The figures for Yubu illustrate this, Table 2. My work was therefore done against a background of bad harvest and subsequent unusually light early rains.

SOCIAL ENVIRONMENT

20. The Zande are organised on a hierarchical system under a number of more or less independent but often related chiefs. Under them come sub-chiefs and headmen. There is a royal clan of ancient standing, the Avongara, but those of its members who came into the survey, though enjoying some social prestige, did not differ particularly in their manner or standard of living from other families around them. The ramifications of the large establishments of the chiefs were outside the scope of the survey, which was concerned with the life of the general public and not the exceptional few. The households of sub-chiefs and headmen were included where they occurred in the sample groups, for their domestic economy was comparable with that of their people.

21. The Zande proper came in as conquerers from further west some generations ago, absorbing or dominating numerous smaller groups. Distinction between them may be of interest to the ethnographer but not from the point of view of the food economy. In the southern part of the district, it is true that some minor or local differences in tastes might perhaps be found to follow the lines of old groupings, but the subject appears to be of little practical interest. There is, however, a real difference in economy between the main (southern) part and the poorer and more sparsely-inhabited north. This is a distinction based on environmental rather than tribal factors. Tambura is taken as a more or less arbitrary point of demarcation ; there is really no clear-cut line of difference but a shading-off according to conditions of soil and climate. For the purpose of this report, those living south of Tambura, though admittedly mixed, are called collectively Zande ; those living north and north-west, a number of smaller tribal units under Zande rulers, are called collectively Balanda.

22. The people of this area were first visited by British forces from Wau in 1902, but British influence was not established till 1907. By the 1920's it had developed into a fuller administration, and Italian Catholic and British Protestant missions were also established. The generation since then has slowly but steadily been increasingly subjected to influences from the outer world.

23. The people live at present in two types of settlement—those recently established under the present resettlement scheme, and those made during the sleeping sickness campaign. Some twenty or more years ago everybody was obliged to move out of the forest on to the roads as part of the sleeping sickness control system, and homesteads are consequently found irregularly strung out along the roads. Some people will be cultivating fields near at hand, others in the course of shifting rotation will have opened up land at a distance, perhaps two to three miles or more. In this case they usually build other huts in the fields and stay there part of the time, especially in the cultivation season.

With the partial relaxation of the controls in recent years, they again have drifted off to other sites.

24. Another type of arrangement is now being tried out in a scheme which is being extended each year. In this the population is spaced out along straight lines, cut through the bush at right angles to major pilot lines. Each holding has a frontage of 150 yards along the lines and is supposed to run back some 1,200 yards, though the further end is not precisely demarcated. It is hoped to anchor the Zande to permanent homesteads on these holdings of about 40 acres, within which there is room for them to move their fields in their shifting rotation. The occupier of each holding must cultivate half an acre, measured out by instructors, of cotton or a specified food crop for sale, as directed, in addition to his usual food cultivation.

25. It would be incorrect to apply the word *village* to either type of settlement, for Zande society lacks the feeling for any kind of corporate life such as that word connotes. There is really no such unit in their social organisation, even though the homesteads in the older type of settlement may be closely grouped. Each has its individual links of kinship and its individual relationships to headman and sub-chief, forming a net-work of interlacing ties cutting across all territorial considerations. One of the objects of the present resettlement is to disentangle the followers of each sub-chief and headman and group them territorially, but it remains to be seen whether any territorial sense of community will develop. It would have to contend with the Zande's passion for domestic privacy. His ideal is a homestead hidden away in the forest, safe from all prying eyes and unwelcome intruders, particularly those who come with adulterous intent. In fact, the new settlement, by stringing the homes out more widely on large holdings, tend to the satisfaction of this separatist taste rather than towards a more sociable form of living. Even in the old roadside settlements, however closely sited higgledy-piggledy the homes may be, their occupants contrive to achieve a quite remarkable degree of privacy, making the most of the dense natural cover and using grass screens, cassava hedges and other devices.

26. The same kind of living arrangements and a similar absence of the villages as a social unit are found among the Balanda, whose settlements are so far all still of the older type.

27. Habits of this kind increased the difficulties of recording, for the labour and time involved in locating people each day was much greater than in a community of more sociable ways.

28. Descent is patrilineal and marriage patrilocal, with payment of bride-wealth, still called spears but now usually cash. It is fixed at 120 P.T. (24 -) payable in two equal instalments, the first authorising what amounts to a trial marriage, and the second ratifying it after which it is registered by the Native Court. The fathers easily find a way round the limitation of amount by extorting various presents of cloth and so on from their sons-in-law during the trial period, as a condition of their agreeing to accept the final ratifying payment.

29. A woman's closest personal and emotional ties tend to be with certain of her kin, and later with her children, rather than with her husband, her relationship with whom has more of the element of

contract. Thus she remains very much under the influence of her relatives even after the completion of a marriage contract, and there is often a severe conflict of authorities.

30. It is astonishing to a newcomer to read of the virtual indissolubility of the marriage bond from the woman's side twenty-five years ago, and the very cautious relaxation in the tribal law induced by Major Larken to alleviate their state of bondage, a *via dolorosa* by which a determined woman could win her freedom by way of prison. Today, under an outward submissiveness of demeanour which deceives no one in tribal society, the women very largely go their own way. Deferment of acceptance of the final payment suits them as well as their fathers, keeping the relationship fluid and undermining the position of the husbands, who are kept in the position of suitors, placating both wife and father-in-law. It is common now for a young woman to make a series of such temporary marriages, and even when a full marriage is entered into, there does not seem to be any real difficulty about getting out of it except where a dispute arises over return of bride-wealth and somebody turns cantankerous, invoking the letter of the old tribal law against her. A year spent on familiar terms with numerous Zande homes. following the intricate tangles of their domestic politics, suggests that if actual practice in the past was as inhuman and rigid as it sounds, then the present generation has seen a social landslide. This fluid background to domestic affairs and instability in relationships is one of the factors encouraging a hand-to-mouth day-to-day manner of living and a lack of interest in improvements which require continuity and sustained effort.

31. It is a much more serious stumbling-block to social development than the practice of polygamy on a moderate scale which, in a society organised on a peasant basis, makes for better living conditions for the whole family. It is the small household which suffers most in seasonal stress periods or from the effects of illness or pregnancy, not the home where two or more women divide the tasks as convenient. Outsiders tend to read their own emotional repugnance into situations whose whole emotional element is differently oriented from their own, and to assume that polygamy must be a state of degradation. In a peasant society, a bigger household means primarily more hands and greater stability. When conditions of living change to a primarily wage-earning economy, polygamy tends to decline without direct attack because the hands are transformed into mouths. Among the Zande peasantry, or in transition groups still closely linked to the peasant tradition, polygamy, at least in its moderate form, still plays a useful part in the social economy. The sex ratio of the population sees to it, of course, that in no society can more than a small proportion of households, say about 12%, be polygamous at any one time, even though by a differential age of marriage a slight increase in the ratio of marriageable women to men is maintained. The number of people who have at one time or another in their lives been members of a polygamous establishment is much larger. The exaggeratedly polygamous household is necessarily a rarity, with special considerations of its own which lie outside the scope of this report.

FERTILITY

32. Polygamy, even in its moderate form, is sometimes blamed for infertility, but in fact it is the normal practice in peasant tribes, both expanding and declining. The causes of the present dearth of children among the Zande have not been unravelled. Whatever they are, they have not yet overwhelmed the non-Zande groups to the north of them. The system of regular inspections for sleeping sickness necessitates keeping population records of a kind seldom available for primitive areas, and information drawn from them will be found in Table 3. It will be seen that in the Yambio Sub-District children made up only 22% of the population and among the Zande in the Tambura Sub-District only 28%, compared with the figures of 36% (Bakiri) and 43% (Bo Road and Sue) for the non-Zande groups further north. Whatever errors may creep in where ages have to be guessed, they can hardly be of a magnitude to obliterate these differences, whose existence is recognised by the Zande themselves, for they talk of going to look for a Balanda wife to get children. As regards trends in total population, the picture is complicated by clandestine border-hopping, either way according to circumstances. An analysis of the records of the Yambio Sub-District since 1933, made by Dr. P. Abbott in 1947, suggested that the population had been more or less stationary since 1940. Evidence of any increase in mortality was lacking, but from sleeping sickness inspections he had a strong impression of a high proportion of childless marriages. When I started visiting families, the number of childless homes was so startling that at first I thought they must be hiding their children from me. Later I made an attempt to collect the life histories of women in the areas where I worked, but preoccupation with other matters prevented much being done on this line and the numbers are small. The results, for what they are worth, are given in Table 4 and are in line with what has been said above.

33. This situation, of a population probably stationary and threatened with decline and a period of overweighting of the older age-groups relative to the young, is an important element in the background of the food economy, especially in relation to the burden of work and future developments.

CHARACTER OF THE PEOPLE

34. On first arrival I was apprehensive lest a community so dominated by oracles, witchcraft and fear of injury by supernatural means would find my interference in matters of food intolerably alarming, and would accordingly be uncooperative even if they did not actually close their doors against me. My fears in this respect were unfounded, and though a series of comic rumours about my intentions went round at my first and principal scene of operations, I had little trouble in getting on good terms with the families and establishing the recording routine among them. There is a servility about the Zande to-day which accords ill with their traditions as a conquering tribe. I think, however, that when they became accustomed to me I got past that and was not merely tolerated but welcome in most of the homes. They could not, of course, understand what I was at, but they humoured me in my daftness.

35. There is an accepted stereotype of the Zande peasantry as gay, laughing, happy-go-lucky people, and up to a point this is true. But underneath this surface picture of happy children of nature is another and to my mind more fundamental one. When I lived for a period in close and constant touch with them in their homes I saw them differently. My most lasting impressions have a sombre quality. First there is the burden of fear and anxiety which they constantly carry in regard to hostile unseen forces, unfavourable oracles, witchcraft set in motion against them by human ill-wishers, and the like—a burden much too lightly dismissed from consideration by outsiders. Secondly, there is a dead weight of apathy and inertia, rooted psychologically, I think, in regret for a past which, at least when seen from a distance, seems much more attractive to them than the more or less incomprehensible present. Physically it derives no doubt from the museum of parasites they harbour and their generally low standard of living. Thirdly, there is a frustrated, helpless acquiescence in or passive resistance to those innovations from without of which they happen to be suspicious for one reason or another, or which have failed to touch off any spring of effective interest in them. Their attitude to life seemed to me bored, with a nostalgic looking backward.

36. This is one end of the scale, seen in those rural families which are relatively unaffected by aspirations to get caught up in the reaching tentacles of the twentieth century. At the other end stand those who are more influenced by modern developments, equally disenchanted with the life of the cultivator as it is, and bent on getting out of it one way or another. New social values are crystallising out in the melting pot into which old and new have been thrown, and as usual are grouping themselves in a manner unfavourable to rural life and its associations with manual work. Some elements of society thus have their faces turned away from farming in one direction, rating almost any form of wage-earning above it ; others, at the other extreme and with many intermediate stages shading off one into another, turn towards the past. Backward or forward and outward they look, but always away from the cultivator's life as it is today, which seems to commend itself to none. Benevolent recommendations or plans for improvements are apt to be like damp squibs in such circumstances, failing to strike a responsive spark.

37. This description of the Zande will be unacceptable to some of those who know them, but it is as I see the situation after a year's study of the family life of various groups. It is important in relation to my work because these psychological questions of interest, incentives and ends are inescapable issues in considering ways and means of establishing, not merely introducing, material improvements.

III.—SCOPE OF THE WORK

38. The survey had its headquarters at Li Yubu in the Tambura Sub-District, a medical station formerly a sleeping sickness settlement. The principal sample group lived near by, a peasant group slightly modified by wage-earning and the proximity of the station. Choice of base and main scene of operations was dictated by extraneous circumstances, viz. the availability of suitable accommodation and the unavailability of transport. Transport problems dogged the survey from start to finish and were responsible for lack of regularity in making repeat observations, and other deviations from the intended programme. The second limiting factor was the nature of the only field staff available, in regard to both education and character.

39. The team consisted of eight recorders, with a clerk-interpreter who was the mainstay of the party. An assistant from the Research Farm in Yambio was lent to the survey for two months during the rainy season, to help in collecting plant, insect and other specimens.

40. Work was undertaken in the following places, for which see the accompanying map (1) :—

(*a*) *Taba*: modified peasant group adjoining Yubu Station. Continuous work throughout the year. Not resettled.

(*b*) *Madi*: peasant group living round Chief Madi's establishment, half-way between Yubu and Yambio. One month's recording in October. They were subsequently resettled, not all together, so the second visit was omitted.

(*c*) *Momboi*: peasant group, first-year settlement just north of Yambio. One month's recording in October and another in March.

(*d*) *Ukua*: peasant group, second-year settlement, 40 miles south-east of Yambio. One month's recording in November and another in March.

(*e*) *Bo Road*: Balanda peasant group 100 miles north of Tambura. One month's recording September-October, another February-March. Not resettled.

(*f*) *Li Yubu Station*: one week's qualitative self-recording by hospital dressers in July. Three days' quantitative recording on hospital and station staff in September, January and April.

(*g*) *Yambio Police*: Two weeks' recording in January.

(*h*) *Yambio Clerks*: One week's qualitative self-recording in January with three days' quantitative recording.

(*i*) *C.M.S. Teachers* (2): various places. One week's qualitative self-recording in July and October.

(*j*) *Nutrition Staff*: at Li Yubu. Apart from some practice recording on themselves, they did three days' quantitative recording in January.

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(1) Nomenclature is inconsistent, being sometimes the name of the chief or sub-chief and sometimes a place name, according to which was most convenient or most commonly used.

(2) Church Missionary Society.

(*k*) *Short Recording* (qualitative) for checking typicality of samples. *Zande.* Mupoi (August)—peasant with some teachers at the Catholic Mission. Not resettled. Ibba (December)—peasant. Resettled. *Balanda.* Bikiri (August)—peasant. Bo Road additional group (February)—peasant. Neither resettled.

41. The work done was as follows :—

(*a*) *Qualitative Food Recording* : kinds of food eaten each day (hence one of my names—Naginimaligba = Mother-of-what-food-yesterday). Recorded continuously for 54 weeks at Taba. Other places for periods indicated in para. 40.

(*b*) *Quantitative Food Records* : food weighed before cooking, for three days at a time in each house. Taba—August, November, January, May. Madi, Momboi, Ukua, Bo Road—in each recording period. Yubu Station—September, January, April. Yambio Police, Clerks, Nutrition Staff—January.

(*c*) *Crop Records* : qualitative on all peasant groups and Yubu Station. Acreages at Taba, Momboi, Ukua, Bo Road.

(*d*) *Work* : attempts to collect some information on activities through the year.

(*e*) *Heights and Weights* : Taba—August, December, April. Madi—November. Momboi, Ukua, Bo Road—at each recording period. Bakiri—August. Yubu Hospital dressers and families—September, Yambio Police—January. Boarding schools : Mupoi—September and May ; Yubu—September and April ; Yambio—December and April. Bush schools from Yubu to Tambura—August, November, April. Other samples obtained at sleeping-sickness inspections in the Bakiri area (August), near Li Rangu (October) and Ezo (November).

(*f*) *Processing and Cooking* : study of methods, timing, etc.

(*g*) *Miscellaneous* : collection of specimens for determination or analysis ; determination of waste factors ; cooking and processing experiments ; collection of histories from women.

42. Drs. H. Woodman, P. Abbott, I. Hussein and D. Mustafa took an interest in the survey from the clinical side. Dr. Abbott has kindly agreed to the inclusion in this publication of his paper entitled " A Survey of Signs of Nutritional Ill-health among the Azande."

43. Some idea of the volume of material handled may be got from the following figure :—

Qualitative food records with other data of which some 10% drew blank. ..	Approx. 21,000 visits
Quantitative food records	between 1100-1200 visits
Cultivations roughly measured	over 200 acres.
Additional cultivations qualitatively recorded	approx. 200 acres.
Heights and weights taken	approx. 2,500
Plant and other specimens prepared ..	approx. 150

This broad approach has two advantages. First, the different aspects of the work interlock, supplementing one another and providing

mutual counter-checks. Many little points of corroboration could not have been foreseen by staff or informants setting out to play tricks, and similarly anomalies serve as warning signals. The material has been carefully scrutinised and sifted, and when necessary discarded; but on the whole it has stood up to test unexpectedly well. Secondly, the various aspects of the survey throw so much light on each other that one would have little confidence in presenting an interpretation based on one alone.

IV.—THE HOMESTEAD AND ITS CROPS

THE HOMESTEAD

44. A normal Zande peasant homestead, that is, the home of a married man, has at least two round huts and a store-hut on poles. The huts have walls of puddled clay, plain earth floors, and thatched roofs the rim of which, in the best examples, rests on forked uprights set a yard or so out from the wall. This not only takes the weight of the roof off the clay wall but leaves an airspace over it, thus making for both greater durability and better ventilation. It also provides a verandah all round the house, protecting the wall from the weather, providing shelter from rain and shade from sun and a place for stowing domestic belongings. The entrance may be closed merely by a movable reed screen or by a roughly carpentered door and frame. Huts range from this down to temporary shelters thatched to the ground over a frame of light poles and sticks. Store-huts are also round, raised on stoutly-built square platforms about four feet high; the wall is of puddled clay with a movable thatched roof resting directly on it. Entry is gained by tilting up the roof at one side on a forked prop and climbing up to the platform and over the wall. (Ladies dressed only in the traditional bunches of leaves fore and aft do not perform this gymnastic feat in the public view). Careful householders take the trouble to put bell-shaped rat-stoppers of clay on the supporting poles of the platform.

45. If there are chickens they will usually be shut up at night in a small clay and thatch contraption raised off the ground and protected by thorn branches, with a round entrance closed by the insertion of a long heavy pole. Or they may be slung up in a tree in a closed basket.

46. An essential feature of every homestead is the *tuka* or spirit-shrine. This is merely a mound with a large branching, or at least forked, arm of *Hymenocardia acida* stuck upright in it. It is sacred to the ancestral spirits, and on it are hung first-fruit offerings, trophies of the chase, shells of eggs after hatching, and so on, to ensure (perhaps supplicate for) a continuance of supplies. The mound may be bare of plants or there may be a selection planted for medicinal and magical purposes.

47. Equipment and furniture is everywhere simple. From a minimum of clay pots, baskets, pestle and mortar, grinding stone, calabashes, gourds, knives, hoes, axes and other implements, spears,

bows and arrows and perhaps hunting nets, with a couch of grass laid on the earth or on leaves, it may range to a variable selection of chairs, tables, beds, boxes, metal utensils, cloths, blankets. Similarly, clothing ranges from a bunch of leaves fore and aft for the women, and a scanty bark-cloth cache-sexe for men, to cotton cloths and dresses, or shirts and shorts. A variety of locally made straw hats adorn the men, and some go in for feathered head-dresses.

48. Water is carried by the women in clay pots or, when they can get them, four-gallon petrol tins.

49. Social custom sets a standard, not always reached especially in new homes, of a minimum of two living huts for a married couple—one called the wife's and the other the husband's. This permits the entertainment and lodgement of guests of either sex. As the children grow up a hut will be added for the boys and another for the girls, possibly at a little distance from the main homestead and surrounded by small plots of the children's own planting. When there is more than one wife, each has her own hut and store. Elderly dependants may also have huts, and, if females, stores in or near the main homestead. In an establishment of some standing there will often be an open shelter for the entertainment of guests and other social purposes.

50. It is common for children to spend considerable periods with other relatives and to be equally at home in a circle of related households rather than rooted in one. This incidentally minimises the seriousness for them of any break-up of their parental home by illness, death or divorce.

51. A study of the intricate network of relationships between households, with interlacing rights and obligations, could not be attempted despite its obvious bearing on the economics of individual homes and group stability. The pattern appeared to be similar in principle to that described in other tribes ; local variation in detail may derive from the heterogeneous nature of the groups absorbed by the Zande. Throughout, there appeared signs of strain consequent on the passing of the more or less closed society on which the efficacy of many of its sanctions depended. It is easier now to get physically or economically out of reach of traditional obligations.

52. A woman cooks on three stones either in her hut, out of doors, under her store-hut, in an old living hut abandoned and used as a kitchen, or occasionally in a hut specially built for the purpose. Firewood is easily come by, and on cold evenings families often sit round a good blaze out in the open.

53. The space between the huts is hard bare earth, clean and swept in a well-kept home. Rubbish is collected in one spot and built up into a low mound which in due course becomes a vegetable plot prized for its fertility. The sites of old huts also produce particularly heavy crops. On the edge of the cleared space will usually be found low ridges which it is the custom to throw up at the very onset of the rains, for the earliest sowings of maize and miscellaneous vegetables. All round, mixed cultivations and bush press close up to the cluster of buildings.

MIGRATION

54. A recently established home will have its main field close at hand, as well as its cassava and vegetable gardens. In older ones there will be varying amounts of miscellaneous cultivation close by, and the main fields probably at some distance. A man counts up the years of his occupation of a homestead by recalling the sites of his fields. I made persistent enquiries into causes of removal to new dwelling-sites, and always it was something to do with the oracles, witchcraft, deaths or illness, or some family reason for having to move or disliking the site. I never found it attributed to the need for new land, though once, troublesome monkeys were mentioned as a supplementary reason. A family would go on shifting its fields time and time again without moving its home, round which there would grow up a miscellaneous collection of food, medicine and other useful plants. But let an oracle speak warningly, or serious misfortune strike them, especially death of an adult, and in fear and haste they would flit and leave it all, even with the year's food half grown. In certain circumstances the buildings might be taken over by another family for a few piastres; in case of a death, they would be left derelict. The family would return to harvest crops as they matured, but these naturally suffered from lack of weeding or other care such as protection from animals. The place would also be re-visited periodically to draw supplies from the store while any remained there. Whatever loss or inconvenience a move might entail, it was made unhesitatingly if the oracles enjoined it or some fear overshadowed the place. Many people regularly consulted the oracles each dry season to find out if they could safely remain where they were or, if not, where they should go. Such habits naturally help to engender an extremely short-term attitude to life and to discourage any interest in longer-range improvements to homesteads, which seem like tempting fate. The strong emotional element inherent in this pattern of living and governing the response to situations as they arise will hardly make adaptation to any scheme of permanent holdings easy.

THE CROPS

55. The crops seen in the different sample groups are recorded qualitatively in Table 5 as a percentage of the units visited in each, *i.e.* 100 means that every unit was growing the crop in question.

56. The unit of recording for this purpose could not always be identical with the unit used in recording food consumption. For production purposes, the family of a married man might be inseparable from his mother or other dependant female relative. In the new settlements she would be living and cultivating on the same holding. Yet as a cooking and eating unit she might be separate, in which case she would be separately recorded in regard to food consumption. On the other hand, an unmarried son might take up a separate but neighbouring holding in the "line" and cultivate only cotton on it, being still an integral part of his parental home in respect of food production and consumption.

57. In this report, therefore, an *agricultural unit* means the unit of joint food production, whether single or multiple in respect of either

eating-units or holdings in the new settlements. A *domestic unit* means a unit which normally cooks and eats apart (1), though of course there may be very close relations between two such units and much coming and going. In such cases, quantitative records would be done on them simultaneously to simplify the question of visiting.

58. The peasant groups are arranged in Table 5 in their order from south to north, and within a basic similarity of pattern a tendency towards restriction in variety of crops is discernible towards the north. The wage-earners' list is also restricted.

59. Some of the plants shown as foods were grown primarily for some other purpose, *e.g.* gourds and calabashes, or deccan hemp. The leaves of the latter were not regarded as edible at all by the Zande, but the Balanda rated them high among their leafy vegetables. The new settlements, Ukua and Momboi, had no mango trees in bearing actually in their homesteads except where they inherited them from some earlier period of occupation of the same sites, but earlier occupation there as elsewhere had left its legacy of mature trees in the bush all round them. Similarly there were as yet no bearing bananas in these settlements, and the cassava rotation was upset (cf. para. 6).

60. Measuring total acreages, even roughly, was not easy because cultivation was in small irregularly shaped patches mixed up with bush, but an attempt has been made to estimate approximate acreages by pacing, either adjusting to a more or less rectangular shape or, if the plot was too irregular for this, pacing out the periphery and sketching the shape to get the angles, for subsequent transfer to squared paper. Measuring acreages of individual crops was even more difficult because the planting was so mixed. A plot was recorded as measurable where the foodstuff in question was a, or the, principal crop appearing in it in reasonable density and all over it. In the absence of any other figures except estimates which made no claim to be more than guesses, it seemed worth making even this rough and ready attempt and presenting the results, tentative as they necessarily are.

61. Table 6 gives total acreages for the four groups for which this information is available, again in order from south to north. They are given per active adult and per head of population. The number of active adults was calculated with allowances for feebleness in old age or partial disablement, such as late pregnancy, serious illness during the cultivation season, or a crippled limb. The effect of differences in the composition of the groups, *e.g.* proportion of children, is seen in the ratio of the columns for active adults and the whole group. The resettled groups, Ukua and Momboi, had a $\frac{1}{2}$-acre cotton plot on each holding in addition to their food crops, and their total crop acreage was therefore of the order of 1.2 and 1.0 acres per active adult respectively. Double cropping was most extensive at Ukua; thus, although the acreage of land cleared for food crops is very similar in the first and second year settlements (0.68 and 0.72 acres per active adult). their crop areas show some difference (0.73 and 0.93) due to the differing proportion of the land cropped twice. See further in paras. 65 and 99ff.

(1) A polygamous home, in which the women cook separately and in turns but the whole household shares the food, is one eating-unit.

Double cropping was entirely absent in the last and northernmost group (cf. para. 108).

62. Table 7 deals with the distribution of the crops within the total acreage. The definition of a measurable plot given in para. 60 above should be kept in mind, and also the fact that these are largely overlapping figures due to mixed planting, e.g. maize and groundnuts, maize and sweet potatoes.

63. Table 8 is a tentative translation of Table 7 into terms of produce per head per annum and calories and protein per head per day[1], taking into account, as a matter of qualitative observation, the additional production referred to in the last column of Table 7. The maize figures in brackets are mere assumptions based on Taba—Ukua and Momboi being taken as Taba, Bo Road taken as one-third of Taba. The figures used for yields, given below, were selected after discussion with a number of people and consideration of all the circumstances. The table makes no higher claim than to give a rough indication of the amounts of produce the acreage figures may reasonably be expected to represent. For a critical discussion of it, see paras. 319 ff.

Yield Figures Used in Preparing Table 8

	lbs./acre		
	gross	*nett*	
Eleusine.....	700	500	(Bo Road 600 and 430)
Maize		900	(Bo Road 700)
Sorghum		800	
Rice	1000	700	
Sweet potatoes .	6000	4000	(Bo Road 4500 and 3000)
Pulses		250	
Groundnuts.....	1000	750	(Bo Road 800 and 690)
Sesame.....		200	

V.—THE LIFE OF THE HOMESTEAD

CHARACTER OF THE SAMPLE GROUPS

64. The groups chosen for detailed study had distinct characters of their own and provided interesting contrasts.

65. The first-year settlement, *Momboi*, was naturally having a hard year, with a lot of building and new clearing to do, and its first experience of fitting cotton into its programme. It attributed to the move and the clearing of the cotton plots its failure to clear more land for groundnuts and to get more land ready in time to permit double-cropping (Tables 6 and 7). For the same reason, what was probably an unusually large proportion of its eleusine was late sown and therefore got caught by the early cessation of the rains. The homesteads, being new, were short of sweet potatoes for the dry season, and of course all cassava had to be fetched from the old houses; nor

(1) Raw edible portion.

were there any bananas in bearing. There was therefore greater interest than usual in the wild yams of the surrounding bush. Altogether, it was a worried and preoccupied group.

66. In strong contrast was the second-year settlement, *Ukua*, which was sitting back and taking life very easily—so easily, indeed, that it could hardly summon the enthusiasm to pick its cotton, much of which was bursting unheeded during the November visit. In both these new settlements I was surprised how freely and strongly the people expressed themselves to me about resettlement and cotton, feeling the one a burden not compensated by its monetary return, and being deeply suspicious of some hitherto unrevealed intention in the other.

67. The *Madi* group, seen on the eve of its resettlement, was prosperous with well-established homesteads ; its crops appeared heavy and exceptionally well forward so that it was much less vulnerable to the vagaries of the end-of-season weather. It was part of an area which had a reputation for producing a surplus of groundnuts for sale to deficit groups, such as the wage-earners at Yubu, either directly or indirectly through trade channels. It is unfortunate that I was not able to follow the fortunes of these families through the early stages of resettlement.

68. *Taba*, the group on which qualitative food recording was continuous throughout the year, was a peasant group modified not only in material ways but in outlook by close association with the wage-earners of Yubu Station and its own partial wage-earning. All of its families probably handled more money than ordinary peasant families, but naturally no direct information was forthcoming. The outer world had touched them all in one way or another. Some of the men were then employed in Yubu Station or had recently been so, or were intermittently (*e.g.* in the dry season) employed there or by one of the traders. Some had lived and worked outside the area, for example a retired policeman, an ex-soldier, or again an old man captured as a child by slavers and taken north where he had remained for many years after his liberation. With some marked exceptions, the group was uninterested in agricultural pursuits and had its face turned in a pronounced manner towards the supposed joys of a wage-earner's life. It was, however, noticeable that some of the ex-wage-earners in it seemed to have arrived at a sort of mean, combining elements of the new and disturbing money economy with appreciation of the independent feeling inspired by the sight of the year's food supply in the store or the ground around them. As a group, Taba was characterised by reduced and sometimes rather slap-dash agricultural activities and boredom with a peasant existence. Its total acreage was somewhat smaller than any other group, and its eleusine fields markedly so. It had more interest in groundnut production with a view to sale in Yubu. That the acreage figures showed up as well as they did was due to one or two exceptional cultivators, including one man who seemed to have got hold of the idea of farming as a livelihood in the new world of money. The other families did not really get beyond thinking on the scale of selling some nuts in driblets as the spirit moved the women, occasional brewing, taking a basket or two of cassava along to the bush-shop when

in urgent need of a few millièmes, and other transactions of a similar petty nature. This man and his family, at least in the survey year, definitely set out to produce a surplus of both gram and groundnuts, not for offering haphazardly in roadside markets but to be put by to await suitable opportunities for advantageous sale.

69. Life was considerably harder among the *Bo Road* people. They lived nearer the bone than any of the Zande, and as a group were accordingly more constantly preoccupied with problems of food supply and readier to go to some trouble to get a bit extra. Here and there in individual Zande homes a similar strain was in evidence, but as a temporary misfortune rather than a continuing state of life. The Bo Road women, comparable in height with the Zande, were markedly thinner, and the men showed a similar tendency, but less pronounced as a group and less consistent as individuals. Average weight for the women was 45 kg. against 50 for Zande women except at Momboi (48 kg.), where also living was hard that year.

CULTIVATION (ZANDE)

70. The year is divided broadly into the rainy season, dominated by agricultural activities, and the dry season, in which no single type of activity is pre-eminent throughout, interest being divided between hunting (even though regulated by restrictions), fishing, building and other crafts, and at the end, termite-catching.

71. The Zande have a reputation as good agriculturists with a wealth of empirical knowledge, skilled in making the best use of local conditions. Their season starts with planting maize, groundnuts and miscellaneous vegetables in March[1]. Maize sowing, always among other crops (groundnuts and eleusine) except on good midden mounds or other particularly fertile plots, is so distributed as to bring in a main harvest in July and August and a secondary trickle till the end of the season. Groundnut-sowing continues to mid-June in Yambio Sub-District and about the first week in July in Tambura Sub-District. The earliest sowings are out of the ground by August, in time to be followed by eleusine, while cucurbits grown for their seeds (*lagenaria*, *citrullus* and bitter cucumbers) follow part of the later crop lifted in September and October. Some families start sowing eleusine from June on, but the majority dally till August and the laggards optimistically go on even into September, though 31st August is officially regarded as the latest safe date. Easily the heaviest crops seen were those of Madi, where reaping began in the last week of September. The main harvest is in November and December. Cassava planting, like weeding, goes on intermittently throughout the growing-season. Pulses are not sown before late June or July, according to locality, for the heavy rain spoils them if sown too soon; the plots are not often more than 100 sq. yds., for various fungus diseases are apt to wipe out larger plots in a few days. Sesame is either sown in separate plots in June or July, or broadcast with the eleusine; plots of it are sometimes seen in the third or fourth year on land which is about

(1) For more detailed notes on individual crops, see Appendix II.

to be abandoned to bush. It appears that an early crop of *lagenari* (*kpagu*) is sown among the maize in the southern areas, and *citrulli* (*datiro*) in July, but I saw practically none further north until the lat planting after groundnuts. *Luffa* (*bangombe*) and *hyptis* (*andeko* were commoner in Tambura Sub-District than further south, the latte broadcast with eleusine and the former set to climb over trees in th fields. Sweet potatoes, once established round a homestead, carr over from year to year, being harvested from September to April A few yams are planted to climb over trees, fences or ridges round th homesteads.

72. There are several, or many, varieties of each crop, with varying cultural or storage characteristics, and sometime differences in culinary qualities and palatability. Information collected about them is briefly noted in Appendix II, a more detailed list not being reproduced here.

73. The pattern of crop succession is flexible, determined by results and the appearance of certain weed indicators, and often cut short by migration. The following description is taken from McCall (xi)

(*a*) *New Land* : The area cleared first is planted with groundnuts and maize during the first half of the rains. Clearing continues, small trees being cut usually leaving tall stumps, larger ones ring-barked, and the grass cut to lie on the ground till it is time to sow eleusine, when the brushwood and grass are burnt(1). The burning is regarded as very important to ensure a good yield. The rubbish remaining is collected in heaps and burnt after which eleusine is sown on this area and on the area from which the earliest nuts have already been harvested.

(*b*) *Second Year* : If the land is good, eleusine may be sown again. If not so good, eleusine with sesame, a little maize and possibly sorghum. If it is eleusine and sesame, cassava may be planted through it to grow up for the

(*c*) *Third year*, when eleusine may again be scattered under it, the cassava leaves being stripped to reduce shade if necessary.

(*d*) *Fourth year* : The cassava is left to fend for itself.

74. Alternatively, the second year may be maize interplanted with *lagenaria* (*kpagu*) or cowpeas or sweet potatoes. This is usually done on plots near the houses. Eleusine, probably with cassava planted through it, is likely to follow the maize and *lagenaria*.

75. Another pattern, noted by me round Yubu, was as follows :—

(*a*) *First year* : Groundnuts with maize, followed by eleusine thickly interplanted with cassava.

(*b*) *Second year* : Cassava left to itself except that long grass may be cut once.

(*c*) *Third year* : Cassava lifted as required.

(*d*) *Fourth year* : As first year, but possibly thinner cassava.

(*e*) *Fifth year* : Eleusine if the cassava is not too thick.

(*f*) *Sixth year* : Cassava, untended, lifted as required. Land then abandoned.

(1) A stock of firewood may be set aside first.

76. Groundnuts cannot be repeated without two intervening years, otherwise they will be heavily infected with disease. Second year plots on this rotation round Yubu were seen in May and June thickly dotted with diseased volunteer plants from nuts left in the ground at the previous year's harvest.

77. Cotton has been found to yield best if sown in May or June, but the bolls then open gradually while rain is still about, and the people complain that the rain spoils it. Their chief objection, however, is believed to be having to pick over a period and so they prefer to sow in July when it will open more or less in one flush in the dry season. The advantages of early sowing are stated to be :—

(*a*) better yield ;

(*b*) neither sowing nor harvesting clashes with other main crops ;

(*c*) damage by stainer is less likely and the longer dead season gives better control of pink bollworm ;

(*d*) buying is over before the termites fly, when the Zande become entirely engrossed with their ant-hills and will not bring cotton to market.

78. The programme is therefore :—

(*a*) plots all to be measured out in April ;

(*d*) plots all to be cleared in April and May ;

(*c*) seed distributed in May ;

(*d*) sowing should be done between 1st and 30th June, but in practice it is more like 15th June to 15th July. Its place in the year's work will be further examined in relation to other occupations later (paras. 97ff).

79. An average return on the usual ½-acre plot is reckoned as 300 lbs. of seed cotton, which, if grading out 70% first grade, 20% second grade and 10% third grade, brought the cultivator a little under LE.2 in 1947. An industrious family on good land, growing an acre yielding 1200 lbs., would get about LE.5. Yields are found to vary from 160 lbs. to 800 lbs. per acre, but one cannot help wondering how much failure to pick may have to do with the lowest yield figures, especially as the example of low yields quoted to me was the very area where I noted the failure to do so in November.

80. Certain crops, sweet potatoes and yams, are regarded as women's crops, and men will not touch them; they are seen only as volunteer plants round the houses of men living alone. In other cases, certain tasks are done only by women, such as weeding and possibly lifting groundnuts, but sufficient store is set by this crop for men living alone to disregard custom and to cultivate a patch for themselves.

81. Broadly speaking, men do the heavier clearing jobs, women the bulk of the weeding and harvesting ; other tasks may be shared. Each woman has her own fields but normally there is mutual help. The produce is called hers. "So-and-So has gone to market to sell her nuts." The beer she makes from her grain is hers and sold by her. In large households usually, and in small ones sometimes, there are also plots called the husband's, which his wives help him to cultivate but the produce of which is separately stored as his, to be drawn by him for sale, for meeting social obligations, or as a reserve.

82. A point which bears on energy expenditure, fatigue and efficiency is the unusually awkward nature of the main implement of agriculture, the hoe. In the first place, the blade is extremely small and secondly, it is set in a short shaft bent at an acute angle in the middle-actually the two arms of a forked branch. This necessitates working in extremely fatiguing stooping postures in which it is impossible to bring the weight of the body into play. All the drive comes from the muscles of the arm and upper body. Similarly the axes are light and small and are wielded with short movements of the arm only, without a proper swing from the body by which part of the work would be done by the body's own weight.

OTHER OCCUPATIONS (ZANDE)

83. Building and repairing(1) begin when the rains slacken in October and November, but many people put it off till later and then, after the bush fires, have a job to find thatching-grass.

84. Fishing is at its busiest as the streams fall, and the women, having got their harvest safely carried and stored, can afford to spend whole days on end at the pools, but it is all on a small scale as the consumption figures show.

85. Meanwhile, after the bush fires thin the vegetation, some of the men go hunting. To protect the young animals, the Administration has forbidden the use of nets for hunting between October and May, a measure bitterly resented by the Zande because the dry season is the time when they feel most in need of stew materials and the menu is most restricted. Over and over again I had to disillusion them of the not unreasonable hope that a food investigator worth her salt would surely be able to help here; and to tell them that however much I sympathised with them I could not do anything about it. A big grievance it certainly is with them, but how far it is really a hardship it is impossible to say, because I could get no reliable comparison with the past. Despite the restrictions, but not necessarily in contravention of them, the dry season remains the season when meat is somewhat more frequently available compared with the season of dense vegetation and agricultural work, though it seems to vary very much from place to place.

86. After the grass is burnt the small boys too get busy chasing vermin and other small creatures for the pot.

87. Finally, after the first storms at the end of February heralding the break-up of the dry weather, the termites begin to fly at night, and intense excitement prevails in the homesteads as people start patrolling their ant-hills, near or far, to watch for signs that the

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(1) The Zande reckon a properly built house to take 30 men-days, including fetching and preparing the materials. This is divided into 10 for the wall and main poles, 10 for the roof structure and 10 for the thatch. A good house, with due attention to repairs, should last ten years, a store hut five or six unless the supports are of ant-resistant timber. A man and wife with only two huts and a store must devote about 25 days each year to building and repairs, assuming the oracles do not require them to flit and start from the beginning again. It is all men's work except fetching thatching grass (either sex) and smoothing the floor (women).

swarming flight is imminent and to ensure that they are on the spot at the right moment. This is probably the only business in the year's round in which the Zande exhibit punctuality, promptness and precision, and it goes to show what wonders can be worked by interest and the conviction that the results are well worth the labour-costs.

88. Detailed notes on all the above will be found in Appendix II.

89. Domestic affairs are reserved until the following sections on foods and feeding. It only remains to add a blessed idleness (and sleeping) to the list of occupations, for the whole of life is lived at a slow pace, and at any time of day some people may be found asleep or sitting contentedly day-dreaming in their compounds.

THE WORK CYCLE (ZANDE)

90. The year's round of work is schematically presented in Fig. [a], in which the lines indicate not continuous work but the *period* over which any operation was observed. Local variations occurred within this spread, with a general tendency to begin and finish planting later towards the north, as might be expected from the rain curves (Table I). Broken lines indicate more or less sporadic occurrence, in advance of or after the main season. For instance, tired of the dry-season lack of vegetables or with store-houses running short for any reason, some families took advantage of the very first heavy storms in late February to throw up ridges around their homesteads and clear small plots on low-lying land for a small preliminary sowing of maize, groundnuts and vegetables. But after an initial outburst of activity the great majority settled down to a dawdle with a limitless vista of to-morrows in front of them, until roused to a scramble to get the last groundnuts planted in June, and to a still greater scramble to finish preparing the grain fields in August.

91. A striking feature of the cycle, compared with that of many tribes, is the overlapping and lack of definition of the seasons, and the unusual latitude in sowing times. This in itself encourages dawdling and pottering. The Zande need not—as many communities must—discipline themselves to a time table of strict and narrow limits, imposed by nature under penalty of hunger. The sense of real urgency which haunts and drives other tribes in the early rains was absent in most families, and even later the consequences of failure to make up for lost time in the last few weeks of the planting season were not viewed with any grave apprehension, for there was always food in the ground to fall back on—cassava and sweet potatoes—and one could scrounge here and there, or go and do some work for one's relatives in return for food or for the Government for cash. Somebody wrote me an essay on the charms of Zandeland, in which the District Commissioner was portrayed as engaged in constantly repelling would-be immigrants from less favoured districts, for in Zandeland a man could eat and hardly ever work. Despite this idyllic picture, families did at times go hungry and become very miserable for a period. But speaking generally, the wide latitude allowed by nature in their work cycle should, it seems to me, be accounted one of the complex of factors contributing to the happy-go-lucky Zande attitude to food and work, which in turn is

reflected in the astonishingly haphazard manner in which their domesti affairs are conducted (para. 189).

92. The picture of the year's round given by the chart is qualitative and an attempt was made to supplement it by recording the principa daily activities of each individual in half a dozen families. This set o records suffered manifold misfortunes, and though it was useful in supplying a good deal of qualitative data and corroboration of other observations, no table could be constructed from it.

93. A rough idea of the position was, however, obtained by recording for each household every day the fact that some time had or had not been spent (by any member) in certain ways. The results are set out in Table 9, as percentages of the total recorded house-days, and show the proportion of days on which the families claimed to have devoted time to (*a*) agriculture, (*b*) work other than routine domestic tasks. Under (*b*) come building, making pots, chairs, implements, etc., hunting and fishing but not termite-catching. It does not include going to market, or the Chiefs' court, or brewing or any other social pastimes(1). The record was affected by the fact that some of the unrecorded days were unrecorded precisely because people were busy at one of these occupations and so could not be found by the recorder, *e.g.* away in distant fields or at the river. But with all its limitations, it shows a work curve in general agreement with other observations so far as its shape is concerned, even if it is all somewhat too low. For instance, the later start to the season as one goes northwards is reflected in the March agricultural figures for Taba compared with Momboi and Ukua ; the particularly early eleusine harvest noted at Madi shows up in the greater October activity there compared with Momboi and Taba, which were then only lifting some of their groundnuts and doing a little desultory weeding of their late eleusine fields. Again, the August scramble in Taba shows up very clearly, with the lesser one over the groundnut planting in June.

94. In the column for special tasks, the Taba figures for February and March include 21% and 23% for fishing respectively, and 14% and 13% for building. No hunting was recorded for Taba, for the families were able to buy dried meat brought over from French territory. The Momboi and Ukua figures reflect one of the differences between a first and second-year settlement, for Momboi had a lot of building to do and Ukua very little. Their figures for fishing and hunting in March were all small, Momboi 3% and 2% and Ukua 4% and under 1%.

95. It soon became apparent both from the few detailed work records and from personal observation that one group in the community did not pull its weight. It had a large mouth but idle hands. The group was the older adolescent boys and young unmarried men. They would feed in their mothers' homes, live nearby in small houses of their own, round which they might plant small gardens of odds and ends for snacks, chiefly sweet cassava, and sometimes they would cultivate token plots of food alongside the family fields as well as putting in odd days here and there on the family cultivations. In the new settlements, they would

(1) I had hoped to make it include some of these things, but my recorders were not adequate.

often take up an independent holding in the "line," growing little or nothing on it save the cotton plot and relying on their mothers for their food. They drifted round the homesteads, hung around the bush-shops, turned up hopefully at social gatherings, wandered off to "town." From their ranks come, of course, a large proportion of the hangers-on scrounging a living on the fringes of wage employment (see paras. 193, 210, 152). It is said, probably with truth, that in former times they used to serve the chiefs, not only in fighting but in cultivating large fields of grain for the chief's food reserve. Conditions have changed, Government buys grain stocks for reserve, cassava is everywhere, the powers of the chiefs over the lives and labours of their subjects are curtailed, and thus, it would appear, this age-group, no longer called on for public service yet remaining as before more or less outside the family work cycle, finds itself in the happy position of getting something for practically nothing. Its older members get called out, of course, with the rest of the men for their month of paid service to Government, as their turn comes round, but for the most part they contrive to eat the fruits of other people's labours.

96. The call-up of the men in turns for essential Government work, for a month at a time, caught some families on the wrong foot from the point of view of their own family work. The summons always appeared to drop on them out of the blue, without notice, and I never knew whether this was really so or whether they had merely not taken the trouble to look ahead and adjust their own programme accordingly. Groups being resettled were exempt from this call for the first year.

97. Turning to the question of fitting cotton into the pattern, it will be seen in Fig. (*a*) that the clearing in April and May coincides with the initial bout of clearing and planting food crops. True, Table 9 suggests that this probably occupies each family only about three days in the week, but what is much more important is that it coincides with the nadir of the curve of energy intake (Tables 21 and 26 and paras. 7, 244, 292), when people were finding three days a week (if in fact it was no more) of the heavy tasks of that season a very real burden. They were losing weight and feeling overloaded with work—as their weight losses showed they indeed were, relative to the energy intake of the moment. There were other times when they were busier in terms of time (Table 9), but not necessarily in intensity of work, but at such times they were feeding better(1). Certainly no period was comparable to the early rains for stress. It seems therefore that the dislike of early cotton-planting may very likely be created partly by the fact that at least in the first year it involves that much extra clearing of new land at the worst possible moment. Things adjust themselves better in subsequent years when the old cotton plot is available instead of new land for the early groundnuts. The preference for a later cotton crop, which bursts in one flush instead of gradually, is also understandable because of the clash with their normal seasonal occupations. After the long cultivation period they do not want to be still anchored to their homesteads. On the other hand, the actual planting time seems to fit in better early than

(1) By the end of June they were looking more cheerful and saying, "The pumpkin leaves are here again, we shall soon be getting fat."

later, when laggards would be trying to catch up lost time in their gra fields.

98. It seems unfortunate that the burden of the first year of cotto should have to be borne in the very first year of resettlement, when a their land is new and the work of clearing heaviest. Relief is given in th form of exemption from Government labour calls throughout th first year, but this would not relieve the specific point of pressur

99. One expected result of cotton-growing was seen workin out according to plan in Ukua. The cotton is uprooted and burnt i February, leaving a clean plot of land ready for the first rains. I seemed likely that this would lead to a bigger early sowing of groundnut and therefore more of the crop would be lifted in time to be followed b eleusine. The proportions of land double-cropped in Ukua in 1947 bor out this expectation, and, by the way they were starting the 194 season, Momboi looked like going the same road in their second season

100. The precise effect this will have on total groundnut produc tion is difficult to estimate, for it would of course be rash to reckon th cotton plots as an unqualified increment. The crop is weeded an possibly lifted exclusively by women, and this limits the total area whic can be undertaken. Groundnut acreages per active adult were foun to be 0.18 at both Ukua (second-year) and Taba (not resettled), wit only 0.08 at Momboi (first-year) (Table 7). What either Ukua o Momboi planted in the year preceding re settlement is unknown, an the following considerations rule out direct comparison between thes three places in 1947 :—

(*a*) The Taba group, with its way of living modified in th direction of a money economy, was growing this crop partl with a view to sale in Yubu market, and may well have grow more than a true peasant group, making room for this in it programme by reducing its eleusine fields (Table 7).

(*b*) The Momboi group considered its groundnut acreage to b below normal due to congestion of work early in the year

101. Groundnuts are an outstandingly important food crop more especially with a diet based increasingly on a staple of such poo quality as cassava, and production for home consumption needs ex panding to level up supplies through the year before any should b regarded as legitimately surplus to local requirements. The new cotto rotation is evidently encouraging this as expected, though what limita tions labour questions may impose or how far its effects may be offse by reductions either in the amount of other land devoted to groundnut or in the production of other crops, only time will show. It is a poin to be watched, and the position at Taba gives a danger-signal, for mor groundnuts at the expense of grain (which in turn means more cassav in the diet) would merely be a nutritional vicious circle, liable to ag gravation by external sale of the additional groundnuts produced

102. Where measured plots of food crops for sale are to be cultivate instead of cotton, as in the most recently resettled areas, similar point will require watching in regard to reaction on the home food supplies and the question of pressure in the first year in particular.

CULTIVATION AND WORK CYCLE (BALANDA)

103. The Balanda pattern of agriculture and other occupations may be described as the Zande pattern modified by environment. The chief differences in crops were that they grew as much sorghum as eleusine, fields of sesame in pure stand or with cassava planted through it, and some sizable plots of cowpeas and earthnuts. Cassava I found well established, contrary to what I had been told, but like the rest of the vegetation it was less luxuriant in its growth and did not develop into a jungle with bush and other remnants of cultivation on the sites of former occupation.

104. The homesteads looked barer in that they lacked the tangled profusion of miscellaneous cultivation round established Zande homes, but on the other hand they were flanked for half the year by patches of towering sorghum, always planted near the houses because of the need to guard it against birds. The Balanda claimed that they planted it on the same land year after year, maintaining fertility by burning the trash and other rubbish just before planting. My specific enquiries into individual families covered occupation periods up to six or seven years.

105. Some elderly informants of the Bo Road group stated that in their childhood bulrush millet had been the staple food, and *Citrullus* (*kaiya*) had been widely grown, as among the Zande. According to them, yields fell off with the appearance of certain weeds and so these crops were virtually abandoned, eleusine and sorghum being adopted from their neighbours to replace the millet. The latter is still planted sporadically through the eleusine, but plants seen in 1947 were heavily infected with a black mould.

106. The succession of crops is neither as long nor as complicated as among the Zande. Except for their sorghum patches, the Balanda say they cannot cultivate land for more than two years—either sesame or groundnuts the first year, followed by eleusine in the second(1). This means more constant clearing of new land. Moreover, the acreage cleared per active adult was found to be larger than in the Zande groups (Table 6). But against this must be set the lighter vegetation which makes clearing less arduous.

107. The principal bitter cassava (*karangba*) is of fifteen months' growth against the twenty-seven months of the *gbazamangi* of the southern Zande, so it was possible for them to fit cassava into the two-year scheme as well as planting it among the sorghum and mixed cultivation round the house.

108. The Balanda year is presented in Fig. (*b*). It shows the seasons more sharply defined than among the Zande, with much less latitude in planting times. With the later onset of the rains the first groundnuts are not planted early enough to be out of the ground in time for eleusine to follow. Whether in any case soil conditions would permit double-cropping may be doubted.

109. Guarding the fields from the depredations of various kinds of animals or birds was a not inconsiderable task in the Bo Road group,

(1) I am not clear how the pulses fit into this.

whereas among the Zande there was relatively little trouble of this kin Mention has therefore been made of it in the Balanda chart but not i the other.

110. With regard to Table 9, the February-March figure fo special tasks includes hunting (11% of the house-days recorded) an fishing (21%). There was more hunting in the Bo Road area all th year round than further south, and a hunter was stationed in th neighbourhood to supply dried meat to the Chief in Tambura.

VI.—THE FOODS AND THEIR TREATMENT

A.—GENERAL

111. Throughout this report, foods are grouped in the followin categories :—

Cereals
Starchy roots and fruits
Pulses
Oilseeds
Oils
Animal products
Vegetables, leafy and other
Juicy fruits and stems
Miscellaneous.

This section does not therefore start with cassava, which is now adays the foundation of the diet, as a glance at Fig. (*d*) will show, bu with eleusine, which appears to have been dethroned from its place as th main staple within the last generation. There is a good deal of evidenc pointing to marked shrinkage of eleusine production within that period

112. Briefly, the basic pattern of feeding in ordinary peasan homes is one meal a day of stiff porridge, accompanied preferably b a vegetable, meat or fish stew, with a sauce enriched by a paste made o groundnuts, sesame or termites ; and additional foods in the way o fresh cassava, sweet potatoes, maize on the cob, groundnuts as require and available. It will be more fully described in the next section unde domestic affairs.

113. A list of food and other useful plants is attached as Appendi I. It is long, but as will be seen later, the range of foods ranking a significant items in the diet is comparatively narrow. It became clea in the course of the survey that the use made of wild products by ordinar households was with rare exceptions negligible, and that in general thes were of interest only to the traveller, hunter or other person temporaril outside the normal pattern of domestic life—and of course to the col lector of curiosities.

114. Particulars of the production and utilisation of the variou foods will be found in Appendix II. Numbers in brackets there an after plant names in the text refer to the plant list in Appendix I.

CEREALS

115. *Eleusine* (3), *maize* (4) and, among the Balanda, *sorghum* (8), are the principal cereals. As foods, eleusine and sorghum, which may be used mixed, are made into flour for porridge; maize is mainly eaten on the cob, but is occasionally also used as flour for porridge or unleavened bread. A few more sophisticated families, either wage earners or with other extra-tribal associations, sometimes make refined maize and sorghum flours and even *kisra*[1]. Porridge of eleusine alone is not favourably regarded except by some of the older people, who have been brought up on it; most eleusine flour now is eaten diluted with cassava to a varying extent, commonly three parts cassava to one of eleusine. All three grains figure prominently in brewing, nearly all the Zande maize crop not eaten fresh on the cob being reserved for this purpose, while eleusine is always in demand as malt for other beers, as well as itself making the most highly esteemed beer of all (see Section IX).

116. Dry *rice* (2), a recent introduction from the Congo, was seen in tiny plots chiefly at Momboi, and is reported to be on the increase round Yambio where, besides the demand for it in the town, the country people are said to be acquiring a taste for it.

117. *Bulrush millet* (5) was seen as an occasional interplant in eleusine fields, especially among the Balanda where it was chiefly used for mixed grain beers.

118. Heads of *sweet sorghum* (1) which have not been cut green for the sweet stem are reaped and used like other sorghum.

119. *Penzi* (6) and *tudu* (7) are two tall grasses found, apparently, only in some rocky hills about fifty miles north of Tambura. Their seeds, not unlike rice grains, are collected in season and regarded with considerable favour locally.

STARCHY ROOTS AND FRUITS

120. In this class cassava leads the field by miles with sweet potatoes as runner-up and the rest practically non-starters.

121. *Cassava* (15) dominates the whole diet, bitter varieties for flour and sweet for roasting or boiling or, occasionally flour. Among the southern Zande the principal bitter cassava, *gbazamangi*, is slow-maturing (twenty-seven months) and susceptible to mosaic. The northern sub-district has switched to *karangba*, introduced from French Equatorial Africa in recent years, maturing in only fifteen months, highly resistant (so far) to mosaic and slightly less protein-deficient than the other—2.7% (in the dry cassava) against 1.7%. (Cf. with cereals ranging from eleusine 4.9% to sorghum 12.9%). *Karangba* is exceptionally bitter and is said to be shunned by wild pigs, for which reason it can safely be planted in fields at a distance from dwelling-houses. Among the sweet cassavas, the one which predominates heavily throughout the district has spread in fairly recent years from the west because

(1) A pouring batter spread wafer-thin on a hot greased iron sheet. Introduced from the N. Sudan.

it matures in only nine months; its protein content is exceptionall poor, only 0.9% (at a moisture content comparable with the instance given above). The ease with which varieties of cassava[1] find thei way in from the west and establish themselves in Zandeland provide a good exemple of the readiness of the Zande to try something nev when its qualities attract them, and brings us right back to the essentia questions of interest and attractiveness in dietary innovations.

122. *Sweet potato* (9) varieties are endless, with seven common ones. Claims were made that red ones could be found, but on enquiry those produced for inspection were never more than red-skinned. Som pale yellow ones were seen. Their vitamin A contribution to the die was therefore problematical and was a point which I ought to hav had cleared up, because the use of suitable varieties would safeguar vitamin A in the dry season. Sweet potatoes are boiled and roaste and eaten alone or dipped in a paste of groundnuts, sesame or termites

123. *Yams* wild and cultivated (13, 16, 18, 18*a*) were in use to small extent, the interest taken in them being usually in inverse rati to prosperity. They are treated like sweet potatoes. *Cocoyams* (17 from the occasional clump in the homestead garden may be eaten couple of times in the year. The same is true of other *tubers* from th bush (10, 11, 12).

124. *Bananas* (14) are a subsidiary food for which condition are most favourable in the southern areas, though yields are poor eve there due to lack of mulching, a practice very seldom followed thoug its value is recognised. For the most part the ripe fruits are eaten raw but there are also plantains for cooking either green or ripe. The appeared seldom in the peasant food diaries but are bought readily b wage-earners and travellers.

PULSES (19-24)

125. *Peas* and *beans* are foods in which the Zande take extremel little interest. The range with which they are familiar is small— cowpeas, mung beans, earthnuts and to a lesser extent lima beans—an they have none of the many varieties of kidney beans so common i some tribes. On the cultural side, their cowpeas and mung beans ar liable to be wiped out by fungus diseases if grown in large plots, an in addition, people are usually short of seed of cowpeas and earthnut because of heavy storage losses. On the domestic side, interest is sligh and cooking unenterprising. Older women will sometimes make good sauce of pounded beans, but younger ones and especially the mor sophisticated say it is too much trouble. The only alternative is a ungarnished and unaccompanied dish of pulses or of mixed cowpea and maize. It was thus an intrinsically unpromising field fo a soya bean campaign which was attempted in recent years, even i this had not been further handicapped by an unfortunate choice o variety which caused indifference to harden into positive antipathy This state of affairs is the more regrettable in that, from the cultura point of view, soya beans seem promising in this area and from th

(1) Similarly, *mangirima* groundnuts and varieties of okra.

nutritional point of view they would make a valuable contribution all round and particularly at two weak points in the diet—protein and riboflavin. The key problem seems to be attractive presentation which involves finding varieties satisfactory in the kitchen as well as in the field. Otherwise it seems unlikely that soya will ever be found outside those institutions where the consumer has to put up with, if not enjoy, what he gets.

128. The Balanda cultivate larger patches of the same peas and beans as the Zande, sometimes as much as half an acre.

OILSEEDS AND OILS

127. *Groundnuts* (26) among the Zande and *sesame* (38) among the Balanda are the principal oilseeds eaten,[1] each with the other as a secondary. These are supplemented by *cucurbit seeds* (27 33, 36), chiefly *lagenaria* and *citrullus*, and *hyptis* (25), and the very occasional use of *forest products* (37, 39*a*). Oils appeared in the peasant records very seldom, but their use tended to increase somewhat with sophistication. *Sesame oil* is the commonest everywhere. The Balanda like *meni oil* (39) and *shea nut oil* (34), collecting the nuts (in a small way) in their respective seasons; the Zande have very little of either. *Termite oil* is highly prized and may be hoarded for special occasions through the year. *Red palm oil* (35) is a rarity outside institutional feeding.

128. Oilseeds are roasted and ground, often with salt and chillies, to an oily paste for use as such or for dilution with water to make a sauce. Groundnuts and cucurbit seeds may be eaten alone after roasting, and freshly lifted groundnuts may be boiled in their shells, then shelled and eaten as a dish by themselves.

ANIMAL PRODUCTS

129. Small amounts of animal products appear in the Zande diet through the year, irregular as to quantity, frequency and locality.

130. *Meat* shares with termites the place of the most highly prized food in Zande estimation. Its more usual forms are scarce, but practically anything which can be caught and cooked goes into the pot—tortoise, several snakes, frog, crocodile, snail, crab, bushrat, fieldmouse. Traders bring in cattle on the hoof for slaughter at centres of population, and occasionally a beast from the small dairy herds maintained in Government and Mission stations is killed for meat. The peasants depend for their supplies almost entirely on hunting. Meat, fresh or dried, is first boiled alone and then cooked with a suitable sauce to make a stew for eating with porridge.

131. *Birds*, domestic or wild, are a very minor article of diet. The poultry population is small and subject to devastating epidemics. Chickens are mostly kept for the poison oracle, *benge*, and are not unfit for eating when killed in this manner. Occasionally they are killed

[1] In the case of the Balanda, the food records (Table 19) disagree with the cultivation records (Table 8). Sesame not only figured much more prominently than groundnuts in the food records, but some was also available for sale.

in honour of a guest (male). Women taste them seldom and tal exist, especially during pregnancy and lactation, but the plain fac that supplies are too limited to leave any over for them anyway. B are cooked like meat.

132. *Eggs* are needed for hatching and are rarely eaten exc for the addled ones left after a clutch has hatched. Some women them, but in any case opportunities for eating them are at present rare to make a taboo nutritionally important. When eaten, they boiled, shelled and cooked with one of the usual sauces for eating w porridge. Pythons' eggs are also eaten.

133. *Fish* is enjoyed with relish by most families during the sh dry season, but a sufficient number are unaccustomed to it to ca protest at first over its introduction in the boarding schools. Sm quantities brought in from outside the district appeared to be bought quickly in the bushshops which I knew best. It was used for stews l meat, dried fish sometimes being pounded to powder first.

134. Among *insects*, termites are a supreme delicacy to the Zan The most important ones are the night-flying species swarming as rains break (*Macrotermes natalensis* Hav.) and in May and Ju (*Macrotermes bellicosus* Smeath). Oil is expressed only from the forn They may be eaten roasted and sun-dried, with salt, or ground to stiff black paste and eaten with salt, or ground and made into a sau for a stew. They may also be ground raw, perhaps with leaves of sw potatoes or cassava to " make them sour," and then lumps of the pa will be boiled with salt or potash or both. They are tasty but extrem rich.

135. Other insects eaten occasionally are caterpillars, some which have quite a vogue in their season, grasshoppers, locusts, crick and ants. Particulars will be found in Appendix II.

LEAFY VEGETABLES (40-67*c*)

136. *Leafy vegetables* enjoy a real popularity among the Zan and are not, as so often, merely a stopgap in the menu. Their absen except unpopular kinds, in the dry season is lamented and the mat remedied as soon as weather permits.

137. Out of the twenty-nine varieties listed in Appendix II, a f only are of importance. They are amaranths (48), Jew's mallow (5 solanum (60), pumpkin (43, 44), cassava, sweet potato rosella (56) a deccan hemp (58). The last is eaten only, and rosella mainly, by t Balanda.

138. The sight of luxuriant mixed greenery surrounding a Zan home during the long rainy season has given rise to a belief that th supplies of such leafy vegetables as amaranths, Jew's mallow a pumpkin leaves are continuously abundant through that period, with surplus which could be dried for the benefit of less fortunate neighbouri districts. It was found in fact that the more popular kinds only co on in irregular flushes, though in some cases maintaining a trickle throu the whole season. The patches of plenty varied from place to pla according to quite chance circumstances. Sweet potato and cassa

leaves fill in the gaps, neither of them being popular, and when only these are available the frequency of use of leafy vegetables drops decisively, and people say, "We have nothing to eat with our porridge." Table 10 shows the seasonal variation at Taba, indicating which kinds of leaves accounted for more than 20% of the total entries of leafy vegetables week by week. For the groups in which food recording was done for short periods, the corresponding information is as follows, the vegetables in each instance being mentioned in descending order of frequency.

Peasant (Zande)		
Mupoi	September	Solanum
		Pumpkin leaves
Madi	October	Solanum
		Pumpkin leaves
Momboi	October	Solanum
		Jew's mallow
Ukua	November	Solanum
Ibba	December	Sweet potato leaves
		Cassava leaves
Momboi	March	Cassava leaves
Ukua	March	Cassava leaves
		Sweet potato leaves
Peasant (Balanda)		
Bakiri	August	Jew's mallow
		Solanum
Bo Road	Sept./Oct.	Rosella leaves
		Pumpkin leaves
Bo Road	Feb./March	Cassava leaves
		Sweet Potato leaves
Wage-earners		
Yubu	September	Solanum
		Jew's mallow
		Pumpkin leaves
Yambio Police	January	Cassava leaves
Yubu	January	Sweet potato leaves
Nutrition staff	January	Sweet potato leaves
		Cassava leaves
Yubu	April	Sweet potato leaves
		Cassava leaves

Preferences expressed ranged among the following:—

Zande	*Balanda*
Jew's mallow (53)	Rosella (56)
Solanum (60)	Deccan hemp (58)
Amaranths (48)	
Pumpkin leaves (43,44)	

The discussion would usually start off by an emphatic declaration that of course okras were better than any leafy vegetables. The Balanda preferences were not due to unfamiliarity with the other kinds, which they grew and ate as well. On the other hand, the Zande regarded

the Balanda's preferences as outlandish ; they liked rosella mode well with a fish stew, but considered deccan hemp inedible. families will not touch cassava leaves, declaring that they make th Others say, and it may well be true, that this is due to insuff pounding of the leaves or insufficient cooking. It may be not passing that Raymond (xx) found the hydrocyanic content of cassava leaves to be between 24.5 and 28.6 mg. HCN per 100 g. ; was almost gone after fifteen minutes cooking and entirely gone half an hour. At the same time, vitamin C losses on cooking extraordinarily small, possibly due to the high natural acidity of this

139. Some Zande families dry a little solanum and Jew's ma in November, and possibly also amaranths. Tender leaves, c and young fruits of rosella are dried by the Balanda and some Zand use in the dry season.

140. Leafy vegetables are seldom eaten without a sauce of gro oilseeds and sometimes okras. Potash is used when necessary to br down fibres and shorten cooking time. Generally leaves are eaten small quantities as part of the side-dish accompanying porridge, but women sometimes cook larger quantities, especially of cassava leav as a meal in themselves without porridge. Amaranths and pump leaves when plentiful are usually reserved for side-dishes in wh leaves are to be the main feature ; otherwise small amounts of leav often mixed, may be added to any kind of stew. Leaves which go sli notably Jew's mallow, are liked for the consistency they give to dish. Cassava leaves or solanum may be mixed with an oilseed pas wrapped in leaves and boiled, making a convenient " packed foo for a journey or to take as a present.

OTHER VEGETABLES

141. *Cucurbits* (70-74, 76) used as vegetables are pumpki gourds, calabashes, and cucumbers. Pumpkins are divided into t classes, plain and flecked, the latter being much preferred for flavo and texture. The fruits of gourds may be eaten young and, among t Balanda, where cucurbits are less abundant, even mature gourds eaten when not too bitter. Young fruits and pumpkin flowers included in vegetable stews. Mature pumpkins are cooked and eat alone, or mashed with an oilseed paste. The kernels of the boiled see may be extracted and eaten, and any cucurbit seeds may on occasion roasted and ground as other oilseeds.

142. *Okras* (78), said to be an innovation of recent years, are n the most popular and widely used of all vegetables. A few peo dislike their sliminess, but the great majority prize them for t consistency they give to a stew. Fresh, they are sliced and cooked in a other usual side-dish ; dried, they are pounded or ground to powder as sauce ingredient, being stored in sufficient quantity to see the ye round till the fresh ones come in again.

143. *Fungi* (126) : These are popular as a stew ingredient wh available, but at no season did they figure prominently in the recor They are seldom dried and stored.

144. *Other vegetables* appear in peasant homes occasionally in insignificant quantities—spring onions, tomatoes, fruits of *Hymenocardia acida*. More sophisticated families may sometimes get ordinary onions, brinjals and other introduced vegetables.

FRUITS (79-125) AND STEMS (128-130)

145. Here, as for leafy vegetables, the list is long but the number making an effective appearance in the diet is even smaller than for leaves. In fact, it amounts to mangoes (107) only. These, found everywhere in profusion, are universally eaten in very large quantities during their three-month season, thousands remaining to rot below the trees. They and other fruits[1] are eaten only as they are, without any form of preparation. In the case of very fibrous wild fruits like borassus palm, the pulp is merely sucked and spat out. No great interest is taken in wild fruits as a whole, and often they may be seen untouched close by the houses. Children have a few favourites, *e.g.* a *amaranthpa* (125), and travellers, hunters and other people temporarily outside the normal domestic pattern eat them when they come across them.

146. Cultivated fruits other than mangoes hardly exist outside Government and Mission stations, except for a few *limes* (112) here and there, especially near bush-shops making an unfermented lime and honey drink for sale to travellers. The juice of limes mixed with powdered chillies was seen very occasionally in peasant homes.

147. Chewing *sweet sorghum* stems is everywhere popular, and *sugar-cane* is seen occasionally in the south. The stem of a *wild fig* is known for its refreshing juice.

MISCELLANEOUS

148. Some examples were noted of wild ingredients for the stew, used only rarely when ordinary ingredients were scarce. They were fruits of an *Irvingia* sp., yielding a kernel which could be ground to paste; a creeper, *Cissus populnea*, whose crushed stem yields a slimy juice used to make a sauce with groundnut paste; green sticks of *Grewia mollis* pounded to give a termite sauce a slimy consistency, young root bark of borassus used in a stew.

149. The only common flavouring used is *chillies*, fresh most of the year, but dried and used as a powder for a short time while out of season. *Mint* is very occasionally found, as a recent introduction.

150. *Honey*, mostly collected for the export market, may be stirred into rice, any kind of pap, or the dough for maize or cassava "bread." Its use with lime juice has been mentioned under Fruits. With a starter of bulrush millet, it also makes a refreshing but heady alcoholic drink, *duma*.

151. *Sugar* was not seen outside more or less sophisticated homes, and there in small quantities.

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(1) Except sometimes bananas (see under Starchy Roots and Fruits) and limes (see below).

BEVERAGES

152. *Beer* (and the spirit distilled from it) has a special section (Section IX). *Tea* and *coffee* appear in the homes of a few wage-earners only. *Honey*—see above. *Cooking-water* from sweet potatoes and cowpeas has a pleasant flavour and is often drunk.

MINERALS

153. *Potash*, or native "salt," is made from the ashes of many plants (136-162). It is prepared by allowing water to seep through the ashes. The liquid obtained may be added to stews. In production on a large scale for sale or storage, it is concentrated by boiling the resulting lump of "salt" is set aside in a broken pot, covered with ashes, and left to dry out. It separates into two fractions, a soft inner powdery portion of poor savour and a hard outer crystalline fraction of good sharp flavour.

154. These products were examined and reported (xxi) to "consist essentially of a mixture of the chlorides and sulphate of potassium and sodium with the potassium and chloride radicles predominating in each case. Both contain a small but appreciable amount of carbonate and the aqueous solution of each is appreciably alkaline. The superior sample contains no calcium, the inferior sample contains a little calcium carbonate but no water-soluble calcium. It also contains an appreciable amount of earthy matter mixed with the calcium carbonate. The superior sample is practically free from this."

Analytical figures will be found in Table 11.

155. *Earths*: Earth-eating does not appear to be a recognised practice in this area, and the survey records do not suggest the likelihood of a need for such mineral supplementation.

B.—PRINCIPAL METHODS OF PREPARATION AND COOKING

156. Treatment of foodstuffs is important (*a*) from the nutritional point of view for its effects on nutritive value, (*b*) in relation to the food balance-sheet for its effects on utilisation and waste, and (*c*) in relation to the general food economy for its costs in terms of energy and time. The following pages deal with the principal techniques only; the treatment of specific foodstuffs will be found in the earlier part of this section or in Appendix II, and a description of brewing methods is given in Section IX.

FLOUR

157. Good flour is the foundation of a Zande cook's reputation as surely as bad flour is the foundation of the Zande's low opinion of the various forms of institutional feeding with which he is now acquainted—schools, hospitals, prison.

158. Grain is stored in the head. It has first to be threshed and winnowed. For food, this is done day by day as required, and in these small quantities it is threshed by pounding in mortars. Larger quantities, for beer or sale, are flailed with sticks. Winnowing is done, preferably with the help of the wind, by shaking in shallow baskets. The heads have to be thoroughly dried before threshing, so large jobs are left till a suitably sunny day but small amounts may be dried in a pot on a low fire. The flailing method takes 100′ per 10 kgs. or about 170 man-hours per ton of grain. Pounding requires 150′ per 10 kgs. or 250 man-hours per ton, and by breaking some of the seeds anticipates the next stage in making flour. This renders the grain unsuitable for beer, as it interferes with germination; the flailing method is therefore always used for grain for beer.

159. Sorghum is threshed in the same ways.

160. For food the grain has then to be cleaned and ground. Cleaning *eleusine* consists in parching it in pots, pounding to loosen the seed coats and again winnowing. Grinding is done by hand, the women kneeling before a large flat stone and grinding with a small one with a backwards and forwards motion, the work being done on the forward push. The result will be flour, good, bad or indifferent, its quality depending on the care and energy put into it by the women. To do it well is really hard work. Hence the bad flour in the institutions using paid or prison labour. The alternative institutional method in use at present is putting it through a Colonist hand-mill, with or without a subsequent hand-grinding by the women. The mill alone cannot grind it to a satisfactory texture, and the women's subsequent efforts, though they greatly improve it, stop a long way short of the standard which would be expected of them in their own homes. Sometimes too large a task may be set, and then they have to hurry too much to get through; or again, stones may be kept in use beyond the point when they should be scrapped. But over and above this, there is the plain fact that the women have no interest in the result and no intention of putting themselves out to get a good one.

161. In their own homes, they may grind once carefully if the stone is a good one, or they may grind a second time to ensure fineness. Time taken and percentage loss were found to vary widely; a fair figure to take would be 350′ per 10 kg. (600 man-hours per ton) and 10% loss on the original grain(1).

162. Experiments were also done on the time required to bring the flour at present used in Yubu Hospital up to a standard more acceptable to those who have to eat it. After cleaning it was being coarsely milled and then ground by hand, at a total time-cost of 380′ per 10 kg. or 630 man-hours per ton. This flour was taken and sieved in an ordinary wire sieve, separating out a coarse fraction of 18% which was re-ground by hand and returned to the main portion. The extra time taken was 50′ per 10 kg. or 85 man-hours per ton of final product, making an increase of 13% in total time-cost. The flour was then of good quality by Zande domestic standards. When the same operation, however, was done with a Zande basket-work sieve the product was

(1) This is actual loss after allowing for mere moisture loss in parching

still unacceptable because the sieve proved too coarse and did not separate out all the fraction needing re-grinding.

163. It being nutritionally desirable that greater use should be made of germinated grains (para. 1 (3)), experiments were done on preparing and using flour after germination. Two methods were tried :—

(*a*) grain cleaned without parching, then sprouted, dried and ground ;

(*b*) grain sprouted, dried, then parched, cleaned and ground in the ordinary way.

Excluding time required for sprouting and drying, method (*a*) took roughly the same time as the usual method of preparing flour, but method (*b*) took 25% longer. A big weight-loss was found after drying the sprouted grain, and losses in grinding were much heavier than with ordinary grain, the two together amounting to about 50% of the original weight of grain. These were only first attempts at an unfamiliar process, and without going further into details, there is reason to think that the losses and time-costs could both be substantially reduced by further experiment. The actual grinding was easy compared with ordinary grain, the time being taken up by other stages of the process. The porridge and pap made from this flour was sweet, especially the flour made by method (*b*) ; method (*a*) made rather gritty porridge owing to inefficient cleaning in the absence of the preliminary parching. Its sweetness evoked considerable interest (" Is there honey in it ? ") in all those who tasted it, but it was too dark in colour to please them and was regarded with greater favour if mixed with a little cassava flour to lighten the colour.

164. As it stands, losses and time-costs combined would more than outweigh any advantage gained in the nutritional value of the finished product, but it is an example of a line of enquiry which should be followed up in an experimental kitchen (para. 9).

165. Two methods of grinding sorghum were seen, one as eleusine, and the other a wet method in which the grain is first pounded to loosen the husks, winnowed, and then put in water overnight. It is ground wet the next day, set aside for another night and then sun-dried into small lumps which can be stored and are quickly and easily ground to flour. This method is preferred because it makes grinding easier and gives a slightly sour taste to the flour. No time tests were done.

166. *Maize* flour is prepared only by wet methods. The simplest and much the quickest is the ordinary peasant method. The whole grain is soaked for twenty-four hours and then ground wet three times. The working time recorded was only 45′ for 10 kg. of the original dry grain, but with interruptions and chatting it actually took about double this time. The dough is not dried but made at once into porridge. Two more complicated methods were recorded in more sophisticated families, both heavy in time-costs (Appendix III).

167. *Cassava* flour is prepared by soaking the tubers in water till soft, peeling and removing large fibres, pulping in a mortar, setting the wet mass aside for twenty-four hours " to run together," and spreading in the sun to dry out in small lumps. This is the retail or storage stage. When required the lumps are easily and quickly ground to flour.

168. The soaking period varies with the dryness of the tubers, averaging four days in the rainy season and seven in the dry, or even longer after fire has swept through the gardens. If taken to a stream, the tubers are soaked whole; if soaked in pots at the house they are first peeled and cut into convenient pieces. The working time, as distinct from the total period over which flour preparation is spread, depends on distance from water and a suitable place for spreading out the pulp to dry. A fair average for these variables is 60′ per 10 kg. of dried cassava, and for digging the tubers, peeling, pounding and incidentals, 100′. This gives a total of 160′ per 10 kg. or 270 man-hours per ton of the dried product, retail stage. Only 40′ per 10 kg. or 70 man-hours per ton is then required to grind the lumps to flour. The process of flour-making may be rated at about 350 man-hours per ton finished product, compared with 600 for cleaning and grinding eleusine without the preliminary threshing and winnowing.

169. The intensity of the work is also very different, threshing and grinding eleusine being hard as well as slow work, while preparing cassava is relatively light and easy. Carrying it, spreading it out and so on do not require any great effort, it is soft for the final grinding and the pounding is quite different from that for eleusine, which is done standing up and with a good deal of muscular effort. A cassava mortar lies lengthwise on the ground and it has a depression in its side to receive the soaked tubers. The woman squats on one end of it with a thick short pestle which she holds in one hand, making short rapid but not forceful strokes.

170. The weight of flour to original tuber naturally varies with the dryness of the tubers, but 40 : 100 may be taken as a fair average. The loss in the final grinding of the lumps is only about 5%.

171. This method of preparation is notorious for the foul-smelling pools it creates in the streams. Actually the cassava itself does not smell foul on removal from the water; it has then only a faint odour of prussic acid: the smell comes from the waste left to decompose in and around the pool. The sour smell associated with dry cassava develops when the pulp is set aside before drying, and it is dissipated in cooking so that the porridge has no such flavour.

172. The opinion has often been expressed that this is probably a very wasteful method of preparation owing to leaching of nutrients during soaking. Analysis of dried cassava prepared with soaking (peeled and cut up, as likely to cause most loss by leaching) and without, proved this theory to be unfounded. There is very little to choose between them. Results on *gbazamangi*, the staple of the southern sub-district, are given below, per cent. (xxiii) (ii).

	Sun-dried	*Soaked and Sun-dried*
Moisture	8.82	8.18
Crude fibre	1.61	1.71
Protein	1.25	1.69
Fat	0.47	0.48
Ash	2.46	1.74
CaO	0.12	0.13
P_2O_5	0.19	0.17

	Sun-dried	*Soaked and Sun-dried*
Carbohydrate by difference	85.39	86.20
Aneurin (vitamin B_1)	†(1)	†(1)
Riboflavin	0	0
Nicotinic acid	no data	0.0008

173. This disposes of the idea of any great nutritional advantage to be gained by the much more laborious South American method of preparation, the introduction of which was at one time attempted, its supposed virtue lying in the avoidance of soaking. The fresh tubers are peeled and grated. The juice is then pressed out by any convenient device and pulp spread out in the sun to dry into small lumps, which are ground to flour when required. If the juice is allowed to stand, a precipitate of starch can be recovered and the liquid itself can then be concentrated by boiling to form cassareep(2). The latter was enthusiastically received by my staff, not as a savoury condiment for sauces but as a sweetmeat (mixed with honey). As a method of flour preparation this is appallingly laborious, requiring over 20 man-hours per 10 kg. or 2,000 man-hours per ton of finished product, excluding digging up the tubers, incidentals of drying and dealing with the cassareep. The pressing involves considerable muscular effort and is difficult for one person to do alone. Moreover, the ratio of flour to original tuber obtained experimentally was under 25 : 100. Small wonder then that this method failed to commend itself to the Zande housewives. In addition, of course, they at first fear the product, believing that cassava cannot be made fit for consumption without soaking. Their fears are, however, much more easily disposed of by demonstration than their very reasonable objection to the labour and time-costs. The only good words said for the method were that grinding was even easier than for ordinary cassava, and the flour finer and free from any smell.

FLOUR PRODUCTS

174. Flour is used mainly(3) for making the stiff porridge (*bakinde*) which is the traditional main dish. For this the proportions of flour and water vary widely, but 2 flour : 1 water may be taken as typical. The flour is stirred quickly into boiling water and cooked for a few moments only, stirring briskly all the time. Pap (*dingbo*) is similarly prepared but with different proportions of flour and water, viz. 1-2 flour ; 3 water.

175. A slightly different method of making maize pap from flour prepared by the first method described in Appendix III was also recorded. The quantities were 600 g. flour and 2,100 cc. water, ending with pap weighing 1800 g., *i.e.* 600 g. flour and 1,200 g. water.

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(1) † = under 1%.

(2) Precipitate of starch not measured. The cassareep was only 0.004% of the weight of the original tubers.

(3) For the more sophisticated *kisra* see para. 115, Appendix II under Sorghum and Appendix III.

2,750 cc. of water were heated to 60° C. and a thin layer of flour was sprinkled on the surface "to make it boil well." When it was nearly boiling, 1,250 cc. of water were removed. The flour was stirred into the boiling remainder in two portions, with a few seconds' cooking between. This pap was cooked an unusually long time, 10'-11', and stirred vigorously all the time. Some of the discarded water was added as required, 600 cc. in all. Preparation time :—20'. The pap, very smooth and almost tasteless, was eaten unaccompanied as a special treat.

176. A minor use of maize or cassava flour is to make *kpakuta*, an unleavened bread made of a stiff dough shaped into long rolls and wrapped up in banana leaves securely tied at each end. It is put into sufficient warm water (52° C.) to cover, covered with more banana leaves, brought to the boil and boiled till the water is nearly all gone (about one hour). Before cooking, the flour is mixed with water, 1 kg. flour to 500 cc. water, and ground for 15'. Honey or mashed ripe bananas may be mixed into the dough, and if the mixture is then too wet more flour may be kneaded in. Preparation time for 1 kg. flour :- grinding 15', preparation and cooking 90'. It may be eaten hot or cold, alone or with roasted groundnuts or sesame or the pastes made of them. Its special purpose is as food for a journey.

PULSES

177. *Cowpeas* and *mung beans* are shelled by lightly pounding in a mortar after thorough sun-drying. They are then winnowed and picked over by hand. Time :—cowpeas 25' per kg. of finished product ; *mung beans*, 40' per kg. of finished product. They are cooked in two ways by boiling or by roasting and grinding to make a sauce. The latter (*apirinda*) is rare, especially among the younger women.

178. *Earthnuts* – no data on shelling. Cooked by boiling only.

OILSEED PASTES AND SAUCES

179. Oilseeds are roasted and ground to a thick paste, which may be eaten as such or diluted to make sauces for stews or leafy vegetables or, when stew materials are scarce, to serve as a broth without other additions.

180. *Groundnuts* require 60' per kg. (of nuts in shell) for shelling and another 45' for roasting, removing red skins and picking over to remove overdone nuts (which will usually be eaten by some member of the household). The waste and weight loss to this point amount to 35% of the original gross weight. To make the paste, the nuts are then ground at least twice or, for the best results, four times. Per kg. of finished product (paste) the grinding-times are :—

2 grindings	..	..	..	50'
3 "	..	..	..	65'
4 "	..	..	..	75'

Preparation time from the original nuts to the paste : roughly 4 hours per kg. of finished product (4 grindings) or 2.5 hours per kg. of original nuts in shell.

181. Sesame is steeped in water for a few minutes, lightly pounded to loosen seed coats, roasted with constant stirring in a potsherd over a low fire, sieved and winnowed, returned to the fire for a few minutes' further roasting, and finally ground. Preparation time :—106′ per kg. of finished product. Inedible waste about 5%.

OILS

182. Oils may be crudely and inefficiently extracted in a number of ways.

183. Sesame is steeped and pounded as for making paste, sun-dried and winnowed, ground without preliminary roasting, and boiled to bring the oil to the surface. Or the paste may be put in a wooden dish and a very little boiling water poured over it, after which it is kneaded by hand to express the oil.

184. *Meni oil and shea nut oil* are extracted by roasting the nuts until they are black, grinding them to a paste and boiling to bring the oil to the surface.

185. *Termite oil* is extracted from *akiodo* (*Macrotermes natalensis* Hav.) only. The sun-dried ants are heated with a little water, put into some form of bag and pressed by hand on a small platform of sticks so arranged that the liquid is collected in a pot. Details of the arrangements vary. Sometimes heavy stones are used. The liquid extracted is then boiled to evaporate off the water.

LEAFY VEGETABLES

186. Leafy vegetables are usually but not always put into boiling water and cooked with the lid off, sometimes quickly, sometimes slowly. After a sauce of oilseeds has been added, with potash, if required, and salt and chillies, the mixture is boiled again for a short time. It is then left, covered, for anything up to a whole day before it is eaten, and generally at least half an hour. If it gets stone cold, it may be re-heated but not always.

187. For trek a leaf and paste (groundnut or sesame) "cake" may be made with solanum or cassava leaves. The mixture is wrapped in leaves and half boiled, half steamed by being put into a pot only partly filled with water which is then allowed to boil away till very little is left.

188. Leaves are only occasionally dried and then in the sun without previous blanching. They are first of all cut up in small pieces. (Okras are sliced and similarly dried.)

VII.—FEEDING

DOMESTIC AFFAIRS

189. The most striking thing about Zande domestic arrangements is their astonishing lack of routine. It seemed at first a mere tale to be told by men, "We don't have any usual meal-times, we eat

when our wives decide to cook," but in trying to establish the recording routine it soon became all too apparent that this was the plain truth. All that can be said is that common times of day for cooking and eating a meal are early morning or midday or evening, but in a group on any given day there will also be some eating about 10 a.m. and others about 3 p.m., and so on. Nor, in many cases, does the individual family have its own regular or normal routine; it varies from day to day.

190. Wage-earning householders are naturally often more regular than peasants, influenced by the husband's hours of work. For recording purposes, however, this convenience was more than offset by the phenomenal amount of sharing that went on in any well-defined group of such families.

191. Where there is more than one woman living in the household, wife or sister or other female relative, cooking is usually done in turns by each woman for the whole group, with a good deal of mutual help in preparing flour and groundnuts. The feeding of the larger households is therefore least affected by busy seasons because someone will stay at home to cook while the others go off to outside work. This advantage was very noticeable in the stress period in April and May when the feeding level (and with it the family's weights) fell most in the small homes, through the weariness of the women.

192. The Zande will tell an enquirer that they like to eat two proper meals a day and a subsidiary one, and this is true as far as it goes. But the operative word is "like," and the informant will probably be a man, whose concern in the matter is confined to the eating. This goal is, naturally, more often achieved in large households than in those with only one woman; there is a strong leaning that way also in the better-to-do wage-earning homes where paid domestic help (usually adolescent boys) is available. Recording showed, however, that in the main the emphasis is heavily on one full meal a day (Table 12)—that is, a meal of a main dish of porridge or equivalent, with accompanying stew or sauce. Subsidiary meals of maize on the cob, roast cassava or sweet potatoes, groundnuts and the like will usually, but by no means always, be taken, according to appetite and convenience. These are commonly cooked individually by the intending eaters, male or female, child or adult. On the considerable proportion of days on which no full meal is prepared, the woman may cook enough of these extras to be eaten at a family session in place of the usual meal, or individuals may fend for themselves, for instance when the wife is away or sick.

193. Gathering impressions of feeding practices from the sight of casual labour in Government stations eternally roasting bits of cassava and other oddments is very misleading, and is probably responsible for the idea prevalent among outsiders that the Zande day is one long series of snacks, and food an incessant preoccupation. It is very likely to be so for people displaced from the normal domestic circle, such as men labouring away from home or youthful hangers-on round the fringes of the wage-world. Their feeding is haphazard in the extreme, and they are well acquainted with hunger. But the Zande family in its home setting gives quite the opposite impression. Food is far less obtrusive there than most outsiders would imagine. The code of manners condemns as a social *gaffe* any undue display of interest or

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eagerness about food in general, though admitting special cases, such as meat and white ants. Good manners prescribe an air of indifference as to when there is going to be something to eat, hungry though one may be.

194. The food for the whole family is cooked together, but the sexes eat apart except sometimes where husband and wife constitute the whole household. The lion's share goes to the men, especially of the more savoury dishes. The stiff porridge is served in shallow wooden bowls or platters (or sometimes now on metal plates), and is carefully smoothed into a neat lump and covered with large soft leaves such as *Bauhinia*. The stew, cooked first, is served in the pot, the women setting a little aside for themselves and finishing up anything the men may leave. Food, hot, tepid, cold, it seems to be a matter of indifference. It may be cooked hours before anyone turns up to eat it ; or a hungry family may be hanging about talking of this and that with seeming indifference but with interest in fact focussed on the cooking fire. It is bad manners for the women to eat their share before the men have had theirs. When through unexpected guests, limited supplies *e.g.* of meat, or shameless appetite, there is no stew left, or through food taboos they cannot eat it, the women afterwards prepare an additional sidedish, and if the porridge has also run low, some supplementary roasted foods, for themselves. They seldom grind more flour than needed for the one meal, and would not wait to grind more to make more porridge. Only occasionally a little porridge is left over to be mixed in with the next day's cooking, and even more rarely a sidedish will not be finished up at the time but kept for another meal.

195. Food is eaten with the hands, the stiff porridge or cooked tubers being dipped in the sauce or paste. Any new foods would have at present to be presented in forms suitable for eating without implements, a small but sometimes not unimportant practical point.

196. Boys feed with the men, girls and young children with the women. The girls usually look very much better nourished than the boys and they are much more regular in their attendance at meals, the boys coming and going at will, often absent and foraging for themselves. At some time in their teens they merge into the privileged class of young unmarried men (para. 95).

197. As might be expected, there are a number of superstitious customs connected with the handling of food, *e.g.* firstfruits ceremonies, but they need not be detailed.

198. Feasting breaks across the normal feeding pattern, and groups of related households will brew and cook jointly for this. All the feasts I attended or heard of, except two, were connected with death—a hasty improvised feast at the actual burial, a full-scale mourning feast at a convenient interval afterwards (sometimes a year or more), repairing family graves, sympathy feasts for the death of a relative living somewhere else. The only explanation vouchsafed to me was that a man " shows how much he loved his brother by his willingness to spoil much food in his honour." The two exceptions were Chief Madi's week-long feast on return from several months in

hospital, and the celebration of someone's return from a long sojourn in gaol.

199. On a feast-day cooking was recorded in one homestead as many as twenty-five times in one day, not including food brought in from other homes. This would be shared by a great many people, in relatively small amounts, for when beer is flowing, people eat much less ordinary food than usual, and good manners demand moderation in guests. The beer supplies will be carefully supervised behind the scenes by the master of the feast, calabashes being circulated among the crowd as he directs. An honoured guest receives a special personal invitation to enter the house where the beer pots are standing, where he will be handed a brimming calabash of the best beer. After tasting a mouthful or two and praising it, he passes it on to his companions, among whom it circulates. A little and a little may make up a plenty before the day is out, but to take a lot at a time is the height of bad manners. How much, if any, extra consumption in terms of grain per head a feast really represents there is no means of knowing, but having seen how drastically the normal home consumption drops on such occasions, my guess is that it is much less than is usually supposed.

200. Primitive as the domestic arrangements are, there is more regard (up to a point) for cleanliness in relation to food than is sometimes thought by outsiders, but of course homes vary in their standards as in any community. The hands should be washed before touching food, either cooking or eating it; cooked food should be carefully covered to protect from dust, pots and platters should be well washed (a very variable item); and a good cook is meticulously careful about cleaning and preparing the materials and picking them over. People often talk as though primitive cooking consisted of any old flour, any old porridge, any old mess in a stewpot, and as if distinctions of quality were unknown. They could not be more wrong. The scope of Zande cooking is limited in the extreme, but within its limits housewifely reputations are won and lost no less than among the students of Mrs. Beeton.

201. No detailed figures for women's domestic activities are available from the attempted work records, but only an estimate that on an average 2.5 hours per woman are devoted daily to the preparation of food, 30-60 minutes to carrying water and perhaps 20 minutes to firewood. To achieve the consumption target set out in para. 13 would require some 40 minutes daily *per head of population* for preparing flour and groundnuts alone, or 700 woman-hours daily per 1000 of population. On the present composition of the Zande population, this means nearly 2 hours per woman for these two tasks alone.

202. Laws of hospitality, social restrictions on who may cook for whom or on cooking for others at all while under certain magical influences, individual taboos and other customary practices modify the details of everyday feeding in varying degrees and may at times seriously affect the well-being of individual persons or households. But their importance to the Zande community as a whole can easily be exaggerated by observers with an eye for social oddities or anthropological curiosities.

203. At the same time, continuous observation of families brought out very strikingly their vulnerability to chance happenings and the

swiftness with which changes in their fortunes were reflected in their general well-being. They seemed to have no reserves of physical well-being to draw on or of morale to support them. Following the fortunes of the same families through the year, it was astonishing how much they changed, and changed again. The whole pattern of life in the homestead could speedily fall to bits through either physical mischance or psychological fear. I saw people put on years in age or go haggard in a few weeks, and some months later they would hardly be recognisable as they shed their apparent years, rounded out again in body and restored their usual manner of living. Among other signs of stress was, of course, haphazard feeding, not bothering, or not being able, to prepare and cook proper meals. The general impression is one of a precariously maintained balance between a state of relative well-being and states of stress, complex in both origin and manifestation.

SPECIAL CLASSES

204. There is not a great deal to record about the feeding of special classes. To go into the matter minutely would require closely detailed studies of individual cases which could not, in the circumstances in which the survey was carried out, be combined with the demands made on time and attention by the wider group study which was my main objective.

205. Of food for *the sick*, there is very little to say. A sesame paste or broth is frequently the recognised vehicle for medicines, and the usual porridge (*bakinde*) may be replaced by a soft pap (*dingbo*). Otherwise, apart from concoctions drunk as medicines, the ingredients of some of which will be found listed in Appendix I, invalids fast or share the ordinary food as appetite dictates.

206. Leafy vegetables are recognised as particularly good for helping *lactating* women to maintain their flow of milk ; also a soured pap made of cassava fibres and eleusine malt. The practice of setting up lactation in a woman who is to foster a motherless infant is known among the Zande as among primitive tribes the world over (iv), though no such emergency occurred for me to observe. The woman, they say, need not ever have had a child herself, but her breasts " must be fat and hanging down." It is said that certain plants are used as galactagogues, *akiri* ants are set to bite the breasts, the child is constantly put to suck, and the woman takes plenty of the soured pap. This information came to light too late in my work for me to collect a plant particularly mentioned, *bamerandu*, whose stem is pounded and made into pap with eleusine malt while some of it is infused in cold water for external application to the breasts. They reckon five days to establish the milk, which is similar to what I myself saw in an actual case in Tanganyika (iv). The infant is meanwhile kept alive on the soured cassava and eleusine pap or sweet sorghum juice.

207. Mothers were shy on the subject of *infant feeding*, fearing interference. What direct information I could get about the babies I saw, suggested no settled practice and I suspect that the age at which any step is taken and the precise nature of the step depend largely on

cradles and medicine men on the one hand and the condition of the mother and her milk supply on the other. Infants for the most part seemed to be plump, with excellent skins, but were often unexpectedly flabby to feel when one picked them up. As in so many tribes, their real troubles come after weaning, especially if circumstances force the mother to do this earlier than the normal two to three years. The ones I saw suffered a severe setback in weight and general well-being. Unwieldy pot-bellies commonly develop at this stage, and persist till the age of eight or nine.

208. The following information on infants is summarised from various informants. After the birth, the mother bathes her breasts with hot water to stimulate the milk, and stays quietly indoors for six days. If the flow is delayed, her baby is given sweet sorghum juice and water, while the mother continues to bathe her breasts and takes soured pap. The infant is suckled at any time, especially if it cries. The age at which supplementary feeding starts varies widely. Some women give it from the very beginning, others start at three months or six months, or even later still. Soft paps of various flours are given; rice when available is highly thought of for this purpose. Some will use only one flour, others only another, and no reasons for choice could be elicited. Mashed ripe bananas may be given, and the soured cassava and eleusine pap is considered very good. Gradually the child begins to take a little of the sauces and stews eaten by the family, and small lumps of ordinary porridge dipped into them. And whenever it is able to handle things it is given bits of this and that to chew at, *e.g.* a roast maize cob with a few grains still on it. Long before it is finally weaned (unless the suckling period has to be curtailed), it is eating the same things as the family but with the invaluable, even if by now small, supplement from its mother, which, to judge by the setback in weight and general well-being in the few cases I saw at the weaning period, is nutritionally significant out of all proportion to its amount.

209. The food records discussed in later sections deal with the samples on a group basis only. Some families, of course, do better than others, but in the peasant groups it was more a matter of greater stability in the larger establishments than of any marked *social distinctions* in feeding pattern. Sub-chiefs, headmen, members of the royal clan, partial wage-earners, people associated with a bushshop—there was little to distinguish them from any of the others in their daily menus, except that they tended to have a somewhat larger share than others of foods which were both less common and highly prized. But even they had their ups and downs.

210. A class into which many people pass temporarily can only be called *displaced*, *i.e.* those who are out of the ordinary domestic pattern. This class includes all temporary labour, all bachelor wage-earners, and many married ones (generally in the lower grades) who through lack of continuity in their work and place of residence do not build up a proper domestic life. The food records do not cover these, and it is certain that they feed worse and in a much more hand-to-mouth fashion than the ordinary families corresponding to them in general standard of living. The survey records thus show only the best

of the picture—the domestic unit. The numbers of those temporarily, or even for long periods, displaced from normal family life, are growing with the expansion of wage-earning of various kinds.

VIII.—FOOD CONSUMPTION — QUALITATIVE DATA

211. The information collected under this head relates to the frequency with which foods were used, irrespective of quantity. It gives a general indication of seasonal variation and differences in food habits. The records have been subjected to careful examination, comparison and checking with other information, and it is considered that on the whole they were well kept, except that minor accessories such as sorghum stems, potash or chillies, and rare items such as fruits, tended at times to be overlooked—by certain members of the team in particular. The results may, however, be taken as a reliable picture of the main features of the feeding pattern through the year.

212. In the Taba group, qualitative records were maintained continuously for 54 weeks, from 16/6/47 to 27/6/48. The results [1] are presented graphically in Fig. (*c*), each column representing one week. The average number of successful house visits each week was 243, and the frequency of use of a food is shown as a percentage of the week's total of such visits (= house-days), ignoring the number of times a given food might be eaten on any one day.

213. The most striking points in Fig. (*c*) are :—

(*a*) the much greater emphasis on cassava than on cereals;

(*b*) the key position of groundnuts among the principal protein foods ;

(*c*) the virtual absence of (i) pulses, (ii) oils (as distinct from oilseeds) ;

(*d*) the alternation of fishing with other activities reflected in the figures for fish from November on ;

(*e*) the extent to which fish and sesame were linked ;

(*f*) the not very impressive showing of termites in February and March compared with the excitement and to-do associated with their capture ;

(*g*) the small showing of yams and cucurbits compared with the impression made by the sight of rampant yam and cucurbit vines in the homesteads ;

(*h*) the relative proportions of cucurbits and okras ;

(*i*) the insignificance of the cucurbit seeds to which a good deal of attention had been directed locally and which proved so unimportant an item as to be included, along with hyptis, among the " other " oilseeds ;

(*j*) the roughly reciprocal nature of the following pairs of curves—eleusine/cassava ; maize/sweet potatoes ; leafy vegetables/okras.

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[1] None of the tables presented in this Section includes beer, for which see Section IX.

214. The question at once arises, how far was the sample typical? Though considered in this report as one of the Zande series, it was mixed with elements from further north, and moreover its peasant character was modified by a certain amount of wage-earning. Table 13 shows, however, that its pattern was essentially similar to that of the other Zande peasant samples, except that, as was borne out by the production figures, the swing away from eleusine was more pronounced than in the southern groups. Slight local variations appeared, such as in the relative popularity of the different cucurbit seeds, which, however, were nowhere found to play so large a part as I had been led to expect. Or again, local as well as seasonal differences appeared in the emphasis on sesame. Some of the Mupoi figures, *e.g.* oils, meat, were affected by the inclusion of a few wage-earning families and their association with the Catholic Mission Station there. The effects of resettlement in Momboi and Ukua are described elsewhere (paras. 5-8, 59, 65-66). It may be noted here that the absence of mangoes in March in Ukua was only partly due to immaturity of the trees; there were bearing trees in the settlement, but they were all late in ripening.

215. Table 14, relating to non-Zande groups in the northern area, offers some interesting points of comparison and contrast. Seasonal changes being in general more sharply defined in this area, there was a pronounced (and different) hungry season and a pre-harvest shortage of cereals which prior to the introduction of cassava would have been a matter of serious concern. I had been told beforehand that cassava was still only in process of introduction into this area, and that it was not yet grown in sufficient quantity to fill the gap. The large extent to which it figured in the records was therefore a surprise, but it was borne out by my personal observation on fields, gardens and domestic affairs, and may be accepted with confidence.

216. Sweet potatoes were in fact more important than they appear in this table, because the best of their season, which tailed off earlier than in the southern areas, fell between the recording periods.

217. It will be seen that the relative importance of groundnuts and sesame was reversed in these groups, and that very little use was made of the cucurbit seeds favoured by the Zande (*lagenaria*, *citrullus*, *luffa*), though it was claimed by some people in the Bo sample that *citrullus* (*datiro*) had been much eaten in the past (see para. 105). More hyptis was grown and eaten than further south.

218. The oils included more meni oil than in other samples. The season for collecting these nuts was in full swing during the second recording period in the Bo Road. Shea trees were equally common in that area, in contrast with the Zande country, and at my last visit in March people were looking forward to the shea-nut season in April. But these oils were a seasonal treat rather than a regular item of diet, and here as elsewhere the part played by oils, as such, was insignificant in the diet as a whole.

219. In Table 15 will be found records on several groups of wage-earners. They are as remarkable for the contrasts among themselves as between them and the peasant groups; see, for instance, the C.M.S. teachers' records (kept by themselves) in regard to eleusine, cucurbit

seeds, animal products, honey and tea, compared with the records for Yubu Station at the same time of the year. Wage-earning families thus varied in their habits and feeding patterns much more than peasant families (cf. para. 2). As might be expected, the range of foods which appeared often enough to warrant a place in the table was slightly extended, there was greater emphasis on animal products and rather more variety in the oilseeds used, while in some cases more use was made of oils. Sugar should probably follow the figures for tea, but as it was rarely actually mentioned it had to go down under the head of "Occasional Use."

IX.—BEER (AND OTHER ALCOHOLIC BEVERAGES)

TYPES OF BEER AND METHODS OF PREPARATION

220. The records in the foregoing section deal only with food. To them must be added beer of various grains, commonly bulked up with cassava. An idea of the varieties found and their proportions can be obtained from Table 16.

221. Zande beers fall into two main classes—strained and thick. Far and away the most popular is *gbangara*, a strained red beer made of eleusine alone, but it is heavy on the eleusine stocks and is more complicated to prepare than the ordinary thick beers. Next in estimation comes strained red beer of eleusine diluted with maize, and after that the various ordinary thick beers, white or reddish according to the mixture. The addition of some malted eleusine improves any beer, even if it be only the dried residues from a brewing of *gbangara*, but other sprouted grains will serve. At the bottom of the scale of esteem come nondescript mixtures perhaps better described as soured or fermented paps than deserving of the name of beer.

222. Eleusine malt is made at any convenient time and stored till required, sometimes for a year and more. The grain, winnowed but not further cleaned (para. 158), is put to soak overnight, then the water is drained off and the damp grain carefully covered and left for two or three days to sprout. It develops tangles of grey mould in the process. It is then spread out in the sun to dry; in wet weather this may take a week or more, the grain being returned, still damp, to its basket at night or during storms. Temperatures from 31°C. to 40°C. were recorded in the centre of the basket compared with air temperatures of 24°C. to 28°C. The malt requires some grinding before use, but this is light work compared with grinding the unsprouted grain.

223. *Gbangara*, the favourite beer, is made by lightly grinding malted eleusine, putting it into cold water (roughly 8 litres to 10 kg. of the original grain), bringing it slowly to the boil and then boiling briskly for eight or nine hours. More water is added as necessary, in all about as much as was first put in. The liquid, a reddish brown, is then poured off and the sludge put into a large wickerwork inverted cone lined with grass and leaves, where it is left overnight to drip into a pot placed underneath. In the morning the liquid so filtered out is mixed

with the rest, and the beer is boiled again for another five hours or so. At this point it is very slightly sweet but otherwise almost tasteless. It is brownish and fairly clear. It is then poured off into smaller pots and hoisted into the store to stand for at least two days. The residue is dried and either used as malt for inferior thick beers or mixed with a proportion of new malt for another brewing of *ghangara*.

224. Methods of making thick beers vary in detail, but the principle is the same in all—sprout the grain, grind it wet or dry, boil and set to stand with or without the addition of malted eleusine. A few examples from the records may be given:

(*a*) Maize was sprouted, ground wet, soaked for two more days, dried in the sun and stored till needed; then the lumps were ground down and boiled for several hours, malted eleusine was added, and the brew set to stand overnight or a little longer.

(*b*) Mixed maize and sorghum was sprouted, ground wet, and the mush put into a basket for two days, then dried and stored. To brew, the dried lumps were ground, boiled for several hours and allowed to stand for twenty-four hours; no malted eleusine was added.

(*c*) Maize was soaked for two days and ground wet, then mixed with malted eleusine and the mush put into a pot for three days to sour. It was then dried, and for brewing was later ground and boiled, more malted eleusine was added, and the brew put to stand for one or two days.

(*d*) Mixed sorghum and eleusine were sprouted, dried, ground, boiled for an hour and allowed to cool. Early in the morning the liquid was poured into another pot. Water was poured on to the residue and worked into it with the hands. Both pots were then left to stand all day, for drinking that evening.

225. The above examples were seen among the Zande. The Balanda laid more emphasis on sorghum in their brewing and apparently made no *ghangara* or other clear beers. Their methods of making thick beers were similar to those of the Zande, with the addition of the following method not noted elsewhere:—

> Maize and sorghum were sprouted, ground wet, soaked for two days, dried and ground. The flour was put into a big pot with only just enough water to prevent it from burning, and heated with careful stirring for between fifteen and thirty minutes, till the woman judged it to be sufficiently cooked. It was then put into boiling water and stirred and cooked like porridge for a few moments. Cold water and malt were added, either sorghum or eleusine, and the brew set to stand till next day.

226. Cassava, it was said, would only make a sort of soured pap, not a proper beer, but it could be used as a make-weight in thick beers and the Taba records showed that it did not appear until some time after the main maize harvest, *i.e.* when grain stocks began to need nursing a little. Only the course fibrous part appeared to be used, and some people said it had to be sweet cassava.

OTHER ALCOHOLIC DRINKS

227. Crude spirit, *araki*, might be distilled from any beer, but usually only inferior white beers would be so used. The still consisted of the beer pot with a smaller pot inverted over it, its neck inserted in that of the first and the joint sealed with clay or cold porridge. From a hole in the upper pot a metal pipe led to a bottle, the joints being similarly sealed. This being a very delicate subject, no further details were obtained.

228. The honey drink, *duma*, is made with a ferment of bulrush millet obtained ready prepared from Wau. The residue of one brew can also serve as a starter for the next. When demonstrated to me, about 60 g. of ferment was used to two (beer) bottles of honey. The ferment was first stirred into 600 cc. of cold water, of which half was then poured away. 100 cc. of warm water (46°C.) was added and the powdered ferment allowed to settle for a minute. Then as much water was poured off as was possible without taking any of the sludge with it. Some hot water was then cooled to 42° C. by adding cold to it, and nearly 800 cc. of this was added, followed by the honey and 1,150 cc. of cold water. After it had been well mixed, the pot was set out in the sun for several hours. It was said that this was a much better brew, with a higher proportion of honey, than that sold in places like Juba. It seemed to be rare in Zandeland, and was not seen by me in any ordinary Zande homes.

PRODUCTION AND CONSUMPTION

229. Beer sells by the calabash, itself a variable measure and sold at variable prices. Price ranges observed were as follows :—

	For 1 *P.T.*
Gbangara	600-1,000 cc.
White beers	1,000-1,600 cc.

Information collected in Yambio suggested that an expenditure of 10 P.T. on eleusine bought out in the countryside would produce about 60 litres of beer. Brewed and sold in the town, this would mean a handsome rate of profit even allowing for cash purchases of firewood and payment in beer to assistants and hangers-on.

230. It goes without saying that records of individual consumption were not to be hoped for, but an attempt was made to get an estimate of the order of magnitude for a group by means of recording the pots of beer seen on sale or in the homesteads, together with any ndirect information which would help in interpretation. When the people realised that we did not intend to interfere they raised no objection to our enquiries, and the time came when even distilling was not always hidden from us.

231. The following estimates do not, of course, pretend to do more than indicate the order of magnitude, and are based on an average pot of 25 litres. For *Taba*, the year's production was around 15,000 litres for a group of homesteads slightly larger than that of the survey families, as it was not practicable to record the beer for these alone.

With a fluctuating population of around 200, this represented 75 litres per head, or roughly 200 cc. per head per day. Its composition and the purposes for which it was brewed are shown in Table 16. It is probable that some of the 5% recorded as brewed for private entertainment was in fact distilled, because in the early part of the survey I was naturally not allowed to know of such activities.

232. A large proportion of the 70% sold would be consumed by people from Yubu Station or passers-by along the road. Against this must be set beer obtained by members of the Taba households at mourning feasts or other brewing occasions outside the group, but as a matter of opinion I doubt if this equalled the amount sold "out." Consumption per head per day for this group may therefore be estimated at between 100 and 200 cc. (say 50-100 calories) per head per day for the year, and, in this case, fairly evenly spread through the year. It was not, of course, by any means evenly spread per head.

233. Owing to variation in processing methods and degree of dilution, and to the frequent use of old beer residues with fresh malt, it is difficult to assess the above production in terms of grain. Some demonstrations came out with a 1 : 1 ratio of kg. of grain to litres of beer, others less than 1 : 3. Assuming the grain : beer ratio to average 1 : 2, we get an annual grain requirement of 40 kg. per head, or for the group, a total of 8 tons of mixed grain, chiefly eleusine and maize (ignoring the addition of cassava, as a make-weight). This may be compared with the estimated production of eleusine and maize, *viz.* 50 kg. and 55 kg. per head respectively (Table 8).

234. It was impracticable to maintain similar continuous recording all over Yubu Station, but sampling suggested that there was something like 75 litres of beer a day to be seen somewhere about its roads and homesteads, very nearly all of it white beer, *i.e.* varying mixtures of maize, eleusine and cassava. This may be taken as representing some 14.5 tons of grain for the year.

235. For other groups, it is only possible to indicate what was happening during the various recording periods.

236. When recording began at the end of September at *Madi*, a cluster of homesteads round the home of Chief Madi himself, they were in the final three days of a week's feast to celebrate the Chief's return after many months in hospital. About 1,500 litres of beer were seen during the month, divided as shown in Table 17. In the circumstances, of course, part of it was consumed by outsiders, but consumption by the survey families during this month might be estimated at about 300 cc. per head per day.

237. *Momboi*, as a first-year settlement, was having an austere year. In October brewing only amounted to 150 litres (kind and purpose not recorded), or some 50 cc. per head per day. In March, despite the preceding poor harvest, they brewed about 650 litres or 200 cc. per head per day, divided as shown in Table 17. It is probable that some of the production recorded as private entertainment was for working-parties planting maize and groundnuts on the previous season's cotton patches, for spurred on by the somewhat depleted state of the store-huts they were pushing ahead with this as soon as weather conditions permitted.

238. *Ukua*, second-year settlement, was feasting during Novemb and brewing mainly for distilling during March. 1,600 litres of be were seen on the first occasion, or about 600 cc. per head per da predominantly red beer of eleusine and maize. The purposes for whi it was brewed are shown in Table 17. In March, in addition to 6 litres of beer, 40 bottles of araki were recorded, say about 25 litre With crude methods of distilling, this might represent roughly 1,0 litres of beer, making the brewing for the month 1,650 in all (see Table 17

239. Beer was available in the *Yambio Police Lines* on ten of th fourteen days recorded in January, but with outsiders constantl coming and going and other beer easily accessible around the town no clue to consumption can be found here (cf. para. 4).

240. In the northern areas, some brewing of various kind (sorghum, bulrush millet, eleusine, maize) was going on at *Bakiri* in August for last-minute working-parties to finish sowing the eleusine crop, but during a month's recording in September-October in the *Bo Road* group, only 100 litres of beer were seen, say 20 cc. per head per day. I even attended a mourning-feast at which there was meat but no beer at all. Of the 100 litres, 75 were of maize and sorghum and 25 maize and cassava. In February-March, however, it was a different story. This was the season to which, as far as possible, all mourning-feasts were postponed, and they were in progress all round. Attempts at recording broke down because there was so much coming and going. The beer being used was made of sorghum and eleusine, or eleusine bulked up with cassava.

X.—FOOD CONSUMPTION — QUANTITATIVE DATA

FOOD INTAKE

241. Quantitative records were run for three days at a time on each domestic unit (see para. 57), closely related units being visited on the same days to simplify the question of reciprocal visiting. In other cases, visitors' shares were deducted from each meal or snack on the basis of equal distribution per head, in all groups except Yubu Station and the Yambio Police, where casual visiting was so constant and indiscriminate that it was impossible to keep track of it ; arbitrary deductions were therefore made in these cases, after considering all information bearing on the point. Members of the family feeding away were allowed for in the person-days. Men or boys living on their own but getting their main meals in a neighbouring homestead were rated at two-thirds of a person in that homestead, no attempt being made to account for the supplementary foods which they ate in their own huts and which were arbitrarily estimated at a flat rate of one-third of their total intake for all nutrients. The families were persuaded for the space of three days to agree beforehand what time they would cook, and on the whole they kept to it. They also proved co-operative in agreeing to keep all waste from any extra foods or supplementary meals which might be eaten between the recorders' visits, and from the

weight (or number) of these it was possible to estimate the approximate amount consumed.

242. The results in terms of grammes of raw edible portion per head per day are given in Tables 18-20. They show up a number of the points already noted in the qualitative records (Section VIII). The March records for Ukua were found to smell strongly of alcohol, and are entered with reserve after knocking off all major knots and excrescences.

EVALUATION

243. Tables 18-20 are evaluated on a per head per day basis in Table 21-23, allowance being made for pot-waste where necessary. The values used are given in Appendix IV. For several reasons it was not practicable to record distribution within the family, and the merely qualitative observation that the men get a relatively large share, especially of stews and delicacies, is all that can be offered. Further, the records deal with feeding in the homesteads only, not with days spent outside the domestic circle, which except in so far as they were spent in some other home would be likely to fall below the domestic level of feeding. This affects particularly the boys (para. 196) at any season, and the family as a whole in the dry weather when the occupations of the season keep people moving about. At this period everybody's meals were much more irregular and haphazard than my records, confined to the times when they were at home, could show. The quantitative records therefore reflect the family's feeding at its best, the distortion being greatest in the dry season.

244. The *Taba* figures (Table 21) follow a curve in general agreement with other observations, if it be allowed that the February calorie level is appreciably higher than the true average for the reason just stated. From para. 232 it would be reasonable to add 50-100 calories to the figures shown at each season, and possibly 1-2 g. protein.

245. The *Madi* figures (Table 21) are almost certainly somewhat lower than they should be because just then the people were away all day harvesting fields at some distance, and there is a strong probability that some supplementary snacks in the fields went unrecorded. They were certainly much more prosperous in appearance than is suggested by a calorie level of 2,050. Beer (para. 236) might have contributed another 150 Calories and 3 g. protein.

246. At *Momboi* the October figures (Table 21), to which there is no appreciable contribution from beer to be added (para. 237), are in keeping with the state of affairs seen there, but the March figures are at first sight surprising in view of the weight losses recorded. The explanation lies only partly in the distortion referred to in para. 243. To a greater extent, it is to be found in the fact that, transport difficulties having caused unfortunate delays in the dry-season recording, the repeat visit to Mombo did not take place until the first storms had broken and the termites were flying. This temporarily bumped up the calorie level considerably[1], not only by direct augmentation but because,

(1) Cf. Para. 36 for the contribution from animal products, mainly termites.

as was agreed on all sides, people were cooking more porridge than they had done at the height of the dry season now that they had a more plentiful supply of good sauce materials. Moreover, though short of sweet potatoes all the season, they were at this time hastily digging up and eating the remainder before they rotted in the ground. The beer seen during this visit might add about 100 calories and 2 g. protein per head per day.

247. The *Ukua* settlement was feasting as to both food and drink during the first visit, and the high calorie figure (Table 21) is not impossible, while the protein level reflects the unwonted plentifulness of groundnuts (para. 99) and the use of more eleusine relative to cassava (cf. Fig. (*e*)), these two items accounting for 50% of the total protein. The beer seen might add another 250 calories and 5 g. protein. The March figures are too doubtful for discussion, except to say that here again the termites were flying, and that I saw for myself that the people were in fact feeding well at the start of this recording period. The beer seen, other than for distilling, might add 100 calories and 2 g. protein ; there is no indication as to how much of the *araki* was drunk during the recording period, how much was for sale out of the group, and how much for local consumption at a later period.

248. The *Bo Road* figures in Table 22 should not be compared directly with those for the Zande groups owing to the different age composition of this group, with its higher percentage of children. There was no beer to add in September-October and unknown amounts in February-March.

249. The figures for *wage-earners* in Table 23 are in general agreement with qualitative observations, and will receive further attention in paras. 252, 296, 299, 301. Records on a small group of clerks in Yambio have not been included because their numbers were too small and the range of variation too great.

250. The interpretation of these tables is reserved till Section XII, but it may be pointed out here that the vitamin C value is an estimate of actual intake after allowing for all losses, and that the protein-carbohydrate ratio is given because of its importance in relation to liver damage (xviii).

SOURCES OF NUTRIENTS

251. The information set out diagrammatically in Figs. (*d*)—(i) shows why all the food categories are necessary, and why, to the frequent irritation of enquirers, the only reply which a nutritionist can make to questions about what should be the average consumption of any given food, is, " It all depends." The foods overlap in their contributions, which dovetail into one another, so that nutritional advice can usually be summed up in one word—variety.

252. *Calories* (Fig. (*d*)) : In all cases cassava was the principal source. The proportion from cereals varied with season and locality ; the severe seasonal shortage in the Bo Road, the small consumption by the Yubu wage-earners and the total absence of cereals from the nutrition-staff diet in January should be noted. The last group was an excellent example of " displaced " consumers, most of them without

relatives in the place, without womenfolk to grind for them, and in any case unable to get eleusine, since none was available for purchase in the market. Yubu Station staff was divided between :—

(*a*) permanent residents who grew some eleusine, but mainly for beer, and shared in the general tendency of the northern sub-district to lean more on cassava than the south ;

(*b*) staff liable to transfer and consequently not inclined to do more than a little mixed cultivation round the houses; and

(*c*) young bachelors (or men whose wives were absent) getting their main meals in other people's houses, if fortunate enough to have some link of kinship or friendship with an established home, otherwise eating irregularly and uncertainly.

The police, on the other hand, had holdings in a settlement outside the town where their families grew food supplies of all kinds, and there was a marked difference between the feeding in families thus established and recruits still waiting to get holdings, the latter being genuinely hungry before the monthly pay-day. Whether they need have been, had they been more circumspect in apportioning their spending through the month and less subject to tradition in regard to hospitality, is another matter. It is worth nothing, however, that in our own country few workers are expected to cope with budgeting for so long a period as a month.

253. Returning to Fig. (*d*) it will be seen that in all groups oilseeds contributed a substantial proportion of the calories, and so did sweet potatoes for half the year(1). Attention has already been drawn to the termites in March (paras. 246).

254. *Protein* (*Fig.* (*e*)) : Taking the year as a whole, oilseeds were the most important source of protein ; animal products were variable, but not as small as might have been expected. They were boosted in March by the termites. The low protein content of cassava is emphasised by the small size of its contribution relative to the amounts eaten. The protein in the diet is well mixed in its origins, with several vegetable sources of good quality—groundnuts, sesame, cassava(2) and a small but qualitatively valuable contribution from leafy vegetables. In view of the supplementary action of different proteins, these diets seem likely to score unexpectedly well in respect of quality.

255. *Fat* (*Fig.* (*e*)) : Oilseeds (and termites in their season) contributed practically the whole amount.

256. *Calcium* (*Fig.* (*f*)) : The very rich sources were fish (because long stewing rendered the softer bones edible), sesame and eleusine, so that these foods made very large contributions to calcium intake relative to the amounts eaten, and in varying degrees the satisfactory totals for calcium were founded upon them. Cassava, on account of the large amounts eaten, also made substantial contributions.

257. The *iron* intake (Fig. (*f*)) was derived from a mixture of sources, and was heavily augmented by termites in their season.

258. *Vitamin* B_1 (*Fig.* (*g*)): It will be noticed that cassava is entirely absent from this diagram, and that the oilseeds in all cases

(1) For Bo Road, see para. 216.

(2) What little protein there is in cassava is said to be of good quality (xxii).

but one made the largest single contribution, compensation for the deficiency of cassava and maintaining intake at a generally satisfactory level (see para. 309).

25.9 *Riboflavin* (*Fig.* (*h*)) came from mixed sources. The relative importance of sweet potatoes is perhaps a somewhat surprising feature of this diagram. The cassava contribution came entirely from fresh tubers, the dried product having been found to contain none.

260. The level of *nicotinic acid* intake (Fig. (*h*)) depended overwhelmingly upon the groundnut supply.

261. (*Note.* The diagrams of the above three nutrients do not include termites, for which no vitamin values were available.)

262. Leafy vegetables were the principal source of *vitamin A* (Fig. (*i*)), with mangoes in their season. The contribution of sweet potatoes is questionable. In view of para. 122, a low value was adopted for coloured varieties, but it is more than likely that sweet potatoes recorded as coloured were often only red-skinned.

263. The chief point to be noticed in the *vitamin C* diagram (Fig. (*i*)) is the way in which the seasons of leafy vegetables, sweet potatoes and mangoes dove-tailed to maintain the supply of this vitamin through the year.

XI.—THE PEOPLE THEMSELVES

HEIGHTS AND WEIGHTS

Adults

264. *Height*: The mean height of 374 men was 167.5 cm. and 415 women, 157.5 cm. The group averages all fell within 167-169 cm. for men and 156.5-159 cm. for women, the non-Zande groups from north of Tambura included.

265. *Weight*: I was not able to ensure that the same people all turned up to be weighed each time, and out of the whole series of weights taken at different times only a proportion were repeats on the same subjects. The weight changes in this smaller series are given in Table 24. The Zande groups gained 4% (men) and 3% (women) during the late rainy season (August to December), subsequently losing 2% and 1% respectively during the dry season (December to April). A little later (May) I noticed that some families appeared to be losing weight rapidly, but only a few check weighings were feasible. These supported the qualitative impression that the losses were occurring mainly in small households where there was only one woman to see to both domestic and field duties. The small Balanda group showed gains of 1% and 2% for men and women respectively for the period October to February, the early part of the longer dry season of that northern area.

266. For the series as a whole, the average weights of non-identical groups weighed in the course of the survey are presented on the basis of weight for a given height in Fig. (*j*), the number in each sample being shown in brackets. They indicate trends similar to Table 24 for the

Zande men and the Balanda, though less defined for the Zande women. They are in line also with qualitative observations in the field.

267. On the whole, then, it appears that the Zande were gaining during the latter half of the rainy season, from maize harvest onwards, and losing during the dry weather when, as qualitative observations showed, their feeding was "ragged" and haphazard, with a temporary improvement at the swarming of the *akondo* termites preceding the period of heaviest work, lowest feeding and falling weights in the early rains. This overall pattern hides a great deal of individual variation, for with the vulnerability of the families to misfortunes (para. 203), the effects of individual circumstances readily overrode the general seasonal trend.

268. The seasonal trend among the Balanda appeared to be different, for qualitative observation supported by the few figures obtained indicated the late rainy season with its severe pre-harvest shortage as a period of weight loss. With the later start to their cultivating season, their first crops began to come in later than further south and their period of relative prosperity was the dry season, when besides the post-harvest plenty they enjoyed better supplies of meat and fish than other peasant groups. It was not possible to visit them during the busy season after the onset of the rains in April.

269. Wage-earners studied at Yubu were not distinguishable from the peasant families and have been included with them. The Yambio police families, on the other hand, were markedly heavier and are shown separately in Fig. (*j*). If it had been the men alone one would have supposed it to be a matter of selection, but it held good for the women too, and thus linked up with other evidence of their general well-being, except for the hungry period experienced in the recruit families towards the end of the month (para. 252).

Children

270. As with the adults, only a proportion of the subjects was seen more than once. Moreover, it was possible to obtain ages for only a fraction of the total. These two considerations have determined the method of presenting the findings.

271. *Height*: Except in para. 275, boys over 160 cm. and girls over 150 cm. have been excluded because the latter subjects might have already reached their final stature.

272. Growth appeared to be erratic in the boys, steadier in the girls. The same was true of the association of growth with weight changes in the two sexes. Among the boys, 11% showed growth but no gain or even a loss in weight, and 15% gained weight but failed to grow. The corresponding figures for the girls were 9% and 3% respectively. For 11% of the boys and 5% of the girls no growth and a stationary or declining weight were recorded, and only 63% of the boys compared with 83% of the girls both grew and gained weight.

273. The two periods covered by the records were the late rainy season and the dry season. Neither could be called better than the other in respect of growth, the pattern of which showed no correlation with season, some children failing to grow in the one, some in the other and some throughout. It thus appeared that any seasonal effect there

might be was masked by overriding individual or family factors (cf para. 203).

274. In the boarding schools at the two mission stations in the northern sub-district, over the period September to April (almost evenly divided between term and holidays) 32% of the boys and 5% of the girls failed to grow in the one (Mupoi), and only 2% and 0 in the other (Yubu). The schools at the Yambio Mission were visited in December and April, nearly all the intervening period being spent by the children at their homes; in that time 13% of the boys and 0 of the girls had failed to grow.

275. A rather surprising difference in height distribution came to light between the schools of the two sub-districts. They were all measured twice, in different school years which meant that between the visits there were considerable changes with many pupils leaving and others coming. On both occasions the Yambio series of boys came out markedly taller than either of the other two, although the educational authorities stated that the age composition of the three schools might reasonably be expected to be comparable. The percentage distribution by height groups of 10 cm. is shown in Fig. (*k*). The same was found for the girls in 1947, but, girls being more erratic in their schooling than boys, the comparability of the three girls' schools is more doubtful. Certainly for 1948 the age composition of Yambio differed from the others, with a greater proportion of younger girls than usual, and this is reflected in the height distribution curve in Fig. (*k*).

276. The average height of adults in all areas was found to vary very little, so that if the schools are in fact comparable in age composition, these curves suggest a tendency to later development in the north relative to the south. Some scanty information about the age of first menstruation (Table 25), relating to the few girls whose ages were definitely ascertainable from mission records or about whom the headmistress knew enough to offer an estimate of age with reasonable assurance, tends in the same direction.

277. Attention is drawn to these observations simply as points of interest, without begging any questions as to their significance, if any, in regard to nutrition.

278. *Weight*: Taking first the data on those individuals who were seen more than once, the percentage weight changes will be found in Table 24. Unfortunately the girls were much more difficult to get hold of in any numbers than the boys, and their series is regrettably small.

279. For the southern (Zande) series, the boys again showed more variability than the girls, gaining 13% in the late rainy season and only 1% over a similar period in the dry season, compared with 8% and 4% for the girls. The children in the small northern series were gaining at a better rate during the dry season than the southern groups. These findings are consistent with those on the adults.

280. In the boarding schools, rates of weight gain (boys) per four months were Yubu 3%, Mupoi 2% and Yambio 1%, but the first two are the average four-monthly gain over a total period of eight months comprising both term and holidays, while the last is for one four-month period of holidays only(1).

(1) By an unfortunate mishap, the corresponding figures for the girls have been lost.

281. The results for the whole series of children weighed at different times irrespective of their identity are shown in Fig. (1) on a weight-for-height basis, omitting height groups under 120 cm., and all the Balanda except August, because their numbers were too small. The figures have been adjusted to the mid-point of the height range in each grade. As with the adults, a more pronounced curve shows up for the males than the females. It may be referred to the more irregular feeding habits of the boys (para. 196), and the diagram suggests that this phase begins approximately when the boys pass the 130 cm. mark—? say seven to eight years.

CLINICAL EVIDENCE

282. Clinical examination of survey families, some school groups, and samples taken from those attending sleeping-sickness inspections, were made by several doctors (para. 42), and they will no doubt be writing up their data later(1).

283. No gross nutritional disease was recorded. The minor signs most commonly seen were some of the changes in skin and mouth(2) usually regarded as indicating shortages of factors of the B vitamin group and/or certain amino-acids, but the nutritional significance of some at least of them was considered questionable under local conditions. A little clinical anaemia was recorded, but mostly of mild degree, especially by comparison with conditions in neighbouring districts. Dental caries was widespread.

284. The following brief preliminary notes are taken from official reports.

285. The Medical Inspector, Li Yubu (Dr. I. A. Hussein), in reporting on his school medical examinations for 1948, recorded the following incidence, in totals of approximately 200, of possible deficiency signs:—

	% *Mupoi*	% *Yubu*
Thickened conjunctivae	48	54
Folliculosis	38	47
Dyssebacia	1.5	3
Hypertrophied papillae of the tongue	48	45
Crackled skin	68	70
Dry skin	73	72
Tropical ulcer scars	48	50

To set these in the context of the general examination made at the same time, the principal items in the latter are listed below:—

	% *Mupoi*	% *Yubu*
Bilharzia	15	9
Ankylostomiasis	11	7
Enlarged spleen	58	53
Enlarged liver	64	63
Scabies	8	17
Taenia	6	14
Tropical ulcer	2	6

(1) Dr. Abbot's findings are give on p. 157.
(2) Angular stomatitis and cheilosis were not among them.

286. The Medical Inspector, Li Rangu (Dr. P. H. Abbott) examined a total of 603 subjects in five groups as follows[1] :—

Boys 5-16 years (estimated ages)	185
Girls 5-16 years (estimated ages)	154
Adult men (excluding old men)	92
Adult women (excluding old women)	122
Pregnant and nursing women	50
	603

The signs most commonly seen were :—

	%
Thickened conjunctivae	62
Folliculosis	18
Dyssebacia	34
Hypertrophied papillae of the tongue	61
Gingivitis	27
" Permanent goose-flesh "	32
Crackled skin	35
Dry skin (legs)	69

287. From the point of view of the dietary investigation, the absence of any glaring incompatibility between clinical and dietary evidence encourages confidence in the latter. Such a check is particularly necessary in an investigation among peasants and with field staff of low capacity, circumstances in which it would not be at all difficult to run into serious error. Without the reassurance of the clinical check, the food records could be presented only with the utmost diffidence, and the help given by the doctors and their willingness to give it on top of their usual work are very much appreciated.

XII. COMPARISON OF REQUIREMENTS, INTAKE AND PRODUCTION

REQUIREMENTS

288. The allowances given as an immediate objective in Platt's Report on Nutrition in the British West Indies (xvii) have been followed as a general guide. It is important to remember that they are applicable not to any one age or sex group but to a mixed population considered on a per head per day basis. The allowances are :—

Calories	2,500
Protein, g.	60
Ca, g.	0.8
Fe, mg.	20
Vitamin A as carotene, I.U.	5,000
Aneurin (vitamin B_1), mg.	1.5
Riboflavin, mg.	1.8
Nicotinic acid, mg.	12
Ascorbic acid (vitamin C), mg.	30

[1] For details see Dr. Abbot's note on p. 157.

n average body-weight of 60 kg. is assumed, which is well above the erage of any Zande group, and iron is stated to be placed higher than sual to meet requirements under conditions of a high incidence of festation with parasites.

289. As regards Vitamin C, in the present report diets have been ted as adequate if over the Medical Research Council's "minimal rotective dose" of 10 mg. and abundant if over its recommended lowance of 30 mg. (xxv). For calories and protein, assessments have en made in two ways, based on the height and weight data:—

(*a*) On the average weight of the group, on the basis of 2,500 calories for an average weight of 60 kg. and *pro rata*, and 1 g. protein per kg. body-weight (xvii);

(*b*) According to the age and sex composition of the group. For calories, an assessment on the lines of Platt's unpublished report on nutrition in Nyasaland (xv) was made, based on body-surface area of adults, heights of children, weights of babies, with allowances for specific dynamic action, growth, and activities both routine and seasonal. Protein was calculated as follows, based on the rates for weight and age recommended by the National Research Council (xii):—

	g./kg. body-weight
Adults, normal	1.0
Women in late pregnancy	1.5
& lactation ..	1.8
Adolescents	1.6
Children 7-12 years	2.0
Children 2-6 years	2.5
Babies under 2 years	3.5

The results by both methods are given in Table 26 with the intake figures for comparison.

290. The calculations would, of course, be thrown out in so far as any group deviated from its normal weight, but with the probable exception of Momboi (para. 293), these may be taken as reasonable allowances *at the present rate of living*.

CALORIES

291. In the light of the weight curves and intake figures, the more detailed assessment (B in Table 26) would appear to be nearer the mark—as it should be.

292. The *Taba* intake figures should be 50-100 calories higher with beer (para. 232), but this does not much affect the comparison. The third intake figure, 2,400 calories, is probably higher than the true average level of feeding at that season (para. 243). In general, the figure-of-eight described by the requirements (B) and intake curves agrees very well with the weight trends—up at period 2, declining at period 3, falling sharply at period 4.

293. The Momboi intake figures adjusted for beer would be 2,075 and 2,550 calories (para. 237), and the reasons for the latter high figure have already been pointed out (para. 246). The fact that most people had lost weight between the two visits indicates that the rise

in intake had only recently occurred(1). The low average weight in th group is partly due to a relatively high proportion of small childre partly to the fact that though comparable with other groups in heigh the adults were below the Zande average in weight, for the whole yea had been a hard one for them. Their allowances should therefore b rather higher than shown in Table 26.

294. *Ukua*, as already stated (para. 247), was feasting at th first recording period and feeding well at the second, with plenty o beer to be added to the totals given in Table 26. How continuous this had been I cannot tell, but the fact that for the group as a whole weights had not greatly changed, though individuals had varied considerably both up and down, suggests that the November feasting had been a short-lived phenomenon. As to the second visit, a little over a month later the people had begun to cry " Hunger ! " in the ears of the District Commissioner.

295. The adults of the Bo Road were rather light in weight compared with the Zande, though comparable in height, and the group average was further lowered by the bigger proportion of children. The relation shown between calorie intake and requirements (B) is probably more or less correct. The beer available at the second period (para. 240) would fill the gap and more, while all the evidence pointed to the season of the first visit as a hunger period. The variation in the weight changes of individuals was particularly striking in this group, where the people were all living pretty near the bone and even slight setbacks or pieces of better fortune produced a marked effect on the well-being of the family.

296. The *police* as a group were prosperous and well fed, and being, as a result, considerably heavier than the peasant groups, their basic energy requirements were higher. The group figures conceal a wide range of variation in intake between the homes of the most prosperous senior men and the recruit families with, as yet, no home-grown supplies to stabilise their monthly food budgets (para. 252), but from general observations it would seem that the latter suffered more from violent fluctuations than from any serious shortfall on the average for the whole month. The amount which should be allowed for beer is unknown (para. 239).

297. In the other groups for which intake records are available, the lack of adequate height and weight data precludes an estimate of requirements on the lines of Table 26, but it is possible to consider the dietary findings in the light of that Table.

298. The only peasant group was *Madi*. Its energy requirements might be equated with those of Taba in the second period, 2,200 calories. The recorded intake was about that level (with beer), with probably some unrecorded extras in the harvest fields (para. 245), and the appearance of the group was prosperous.

299. Only a few of the Yubu *wage-earners* and their families were weighed, and that only once and with some difficulty. They did not wish to be weighed, and the matter was too troublesome to be

(1) The average weights for this group in Table 26 are not necessarily inconsistent with this, because the two samples are not identical.

wealth pursuits. The sample weighed fitted into the ordinary peasant series and was in no way outstanding like the police. Similarly their level of feeding was qualitatively and quantitatively lower than that of the police. The amount to be added for beer is unknown. From their appearance these families were meeting their energy requirements, and considering the levels at which requirements run in Table 26, and allowing for beer, their food records would appear to be reasonably complete.

300. The same may be said about the *nutrition staff* and its hangers-on in the form of small "servants."

PROTEIN

301. Protein allowances naturally come out higher (Table 26) by the more detailed assessment (B) than on the simple basis of 1 g. kg. body-weight (A). Intake will be seen to be extremely variable, generally falling short of the allowances in the rainy season and reaching them in the dry season. On consideration of all the evidence on intake it seems likely that for the whole year it is somewhat below the weighted allowances though not by nearly as wide a margin as many people would expect in a stockless community. The wage-earning groups did not always do better than others, *vide* Yubu Station in September, for market supplies were irregular and uncertain. Owing to uneven distribution, it is likely that the protein intake of some families, and still more of individuals within families, was never adequate.

302. All in all, the total protein intake may be described as fair, but a probably more important point is the protein-carbohydrate ratio, which should not fall below 1 : 10 (xviii). The position as revealed in these records is therefore precarious (Tables 21-23). When uneven distribution as between families on the one hand and individuals within them on the other is taken into account, this may be considered the principal danger-point in the diet, and its possible contribution (para. 250) to the extremely high incidence of enlarged liver (para. 285) merits attention. The imbalance might, moreover, easily be aggravated, e.g. by further encroachment of cassava, or by unwise sale of groundnuts, which make a double contribution in this matter, first through their very high protein-carbohydrate ratio and secondly through the energy value of their oil, the loss of which would probably be made good by increased consumption of starchy foods.

FAT

303. The proportion of fat in the diet is reasonable.

CALCIUM

304. In order to see how far it might differ from the overall allowance of 0.8 mg. per head (para. 288), an estimate was made on the basis of 1 g. for each child and for women in late pregnancy, 1.5 g. for lactating women, and 0.7 for all other adults. The results came out to 0.8 g. per head for all groups except the Bo Road 0.9 and the police families and nutrition staff, 0.7.

305. There need be no anxiety about calcium intake in the diet as it is at present, but if the decline of eleusine continues, intake will fall, other things being equal.

IRON

306. Iron intake tended to be higher in the peasant than in the wage-earning groups (except police) ; the latter groups fell short of the high allowance of 20 mg., but reached levels which would normally be considered adequate.

VITAMIN A

307. The estimated vitamin A intake in so far as it depends on sweet potatoes (Fig. (i)) is open to question (para. 122). It is clear from the records that intake was in any case inadequate in the dry season. The two richest sources then available—leaves of cassava and sweet potato—are unpopular and therefore only moderate use is made of them. For the rest, intake at that season depends on the use of suitable types of sweet potatoes until the mangoes come in March. In the absence of signs of vitamin A deficiency, it is to be presumed that intake during the rainy season is sufficient to carry the people over the period of shortage.

308. A point worth noting, however, is that the dry season brings a condition known to the Zande as *vurute*, which, they say, means " white skin." It is a dry flaky dustiness of the skin, found particularly among the boys.

ANEURIN (VITAMIN B_1)

309. Taking the allowance as 0.6 mg. per 1,000 non-fat calories, requirements for the different groups work out as below, recorded intake being set alongside for comparison.

		Aneurin, mg.	
Zande Peasant		*Requirement*	*Recorded Intake*
Taba	August	1.1	1.2
Madi	October	1.1	1.3
Momboi	October	1.1	1.5
Taba	November	1.4	1.8
Ukua	November	1.5	2.3
Taba	February	1.2	1.4
Momboi	March	1.1	1.1
Ukua	March	(1.1)	(1.4)
Taba	May	1.0	0.9
Balanda Peasant			
Bo Road	Sept.-Oct.	0.8	0.7
Bo Road	Feb.-March	1.0	1.1
Wage-earners			
Yubu	September	1.1	0.9
Police	January	1.4	1.5
Yubu	January	1.2	1.2
Nutrition Staff	January	1.1	0.8
Yubu	April	0.9	1.1

Thus all reached the stated requirement level, except Tabo in May, Bo Road in September-October, Yubu Station in September, and the nutrition staff in January (cf. para. 252). That these levels were reached in spite of the absence of this nutrient from the staple food is an achievement attributable in the main to groundnuts (Fig. 9); making yet another reason why any tendency in the direction of selling groundnuts and filling up on cassava (para. 101) is a danger signal. With a grain staple, the position would be a great deal less vulnerable.

310. The Balanda, with sesame in place of groundnuts, are more vulnerable than the Zande, as is shown by the Bo Road figures for the season when grain supplies were at their lowest.

RIBOFLAVIN

311. In Tables 21-23, intake of riboflavin falls ludicrously far short of the recommended allowance, para. 288, and it is still so even if a restricted allowance of 1.2 mg. be adopted as the standard of comparison, though beer is likely to make a useful contribution towards filling this gap (vii and xix). That minimum requirements are not fully met is suggested by the clinical evidence, but it does not appear that there is more than a minor degree of deficiency. It would seem that either the recommended allowance is extremely generous or some of the analytical figures used are too low.

NICOTINIC ACID

312. So long as groundnut consumption is maintained, there need be no anxiety over nicotinic acid. The Balanda, again, are in a more vulnerable position than the Zande.

ASCORBIC ACID (VITAMIN C)

313. Recorded intake ranged from adequate to abundant.

PROVISION FOR LABOUR AND OTHER WAGE-EARNING GROUPS

314. Development projects involve a sustained output of energy at a level unknown in peasant life. Their effort is intermittent; spasmodic bouts of output, maybe at a high rate while they last, are interspersed with periods of very low activity, the balance between output and intake being struck at a low level (Table 26).

315. The extra effort demanded of wage-earners, slow and inefficient though they may be by western standards, means hungrier men. Before the days of development, the essential labour requirements of the area were met by drawing off a few hundred men from their homes each month to do one month's paid service. In 1948, with development projects not yet by any means in their stride, the labour force had risen to 2,000, of whom 80% were temporary employees on the old basis, and some 400 were regular wage-earners. This was already creating a feeding problem. On the old scale of operations, the men found no difficulty in making their own arrangements, lodging or feeding with relatives and drawing on the reserve of food in the ground round any settlement (abandoned cassava run wild). With the ever-expanding demand, however, and its tendency to [illegible] at

certain centres, by 1948, the situation had become difficult, and step were being taken to organise better arrangements. The needs of body of permanent labour in the industrial concerns have now to b considered, and on top of that, the question of supplies for a smal group of Northern artisans with different tastes and customs.

316. The gap between the average requirements of the mer in ordinary peasant life and of men doing manual labour for an employe is estimated at about 400 calories a day. In the peasant groups, the energy requirements of the men alone averaged 2,500 calories, ranging from 2,400 to 2,700 calories according to season. Combining the peasant groups into one series, the men's requirements for a merely pottering existence come out at 2,100 calories estimated by method B (para. 289). For employed labour, 800 additional calories would allow for a moderate working day with a fluctuating output of energy. Sustained heavy work would require more, but 800 is probably a fair average for Zande gangs. This makes 2,900 calories against the peasant's 2,500. For a labour force of 2,000, the additional 400 calories per head per day represent an increased requirement of 10 tons of flour (or its energy equivalent) per month *over and above* normal food consumption.

317. Similarly a bigger food demand is arising from small groups of other wage-earners here and there, cf. the police families' records, not to speak of schools, hospitals and prisons aiming at a better standard for pupils and patients or at meeting requirements for hard work. All these things mean a heavier demand on the subsistence food economy, which in the first place is not designed or organised to produce a regular surplus and in the second place has to stretch itself to meet these new demands despite a steady (even if still small) draining away of producers to become mainly or wholly consumers. Even without the attractions of a very high market for foodstuffs outside the district altogether, the traditional food economy is under increasing pressure. To this may be added, in, say, the next decade, the burden of a population overweighted in the upper age grades (para. 33).

318. The production of special plots of food crops for market (instead of cotton) was beginning in the survey year, and was the first organised step in adapting the traditional food economy to the changing conditions.

INTAKE AND PRODUCTION

319. If the relevant items in Table 18 are evaluated on the same basis as the items in Table 8, we get the following results :—

Group	*Month*	*Calories*	*Protein, g.*
Ukua	November	2,175	55
	March	(1,300)	(39)
Momboi	October	1,075	37
	March	1,025	25
Taba	August	850	26
	November	1,325	44
	February	1,200	34
	May	600	17
Bo Road	Sept.-Oct.	600	29
	Feb.-Mar.	875	29

These are a long way below the tentative estimate of production made in Table 8, but the comparison is not a direct one.

320. First, the seasonal swing in the consumption of these particular items has to be considered, and there is insufficient data to show where the true average for the year may lie. Secondly, the figures in Table 8 are extremely tentative; for instance, unproven rates of yield for the mixed plantings of the peasants, qualitative estimates of the proportion of "Additional Plantings" (Table 7) to measurable plots, and the assumptions made about maize (para. 63), are all obviously vulnerable points. Thirdly, the percentage of loss (apart from waste in the actual processing) between field and cooking pot is an entirely unknown factor, and data collected by the Nyasaland Nutrition Survey (xv) indicate that it may well be large. Fourthly, sales of produce and amounts used in brewing have to be deducted from Table 8. The only data on either of these points refer to brewing at Taba, where it was estimated that approximately 40 kg. of grain (eleusine and maize) per head were devoted to beer.

321. This halting attempt to relate consumption to production has not got very far, but its shortcomings are themselves informative.

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Also plant lists and other unpublished material available locally.

ACKNOWLEDGEMENTS

I gratefully acknowledge help, cooperation and advice from many people and departments.

APPENDIX I.

ZANDE FOOD PLANTS (WITH SOME MEDICINE PLANTS AND OTHER USEFUL PLANTS)

1. In compiling the following lists I have drawn upon several prepared by other people, to whose work I have added my own investigation from the dietary point of view. The food list is, I hope, fairly complete as regards cultivated plants; there are certainly still omissions among the wild ones. The other two lists are sketchy, merely representing such information as was acquired incidentally during the food investigation.

2. The food list is classified as follows:—

Cereals
Starchy roots and fruits
Legumes
Oilseeds
Leafy vegetables
Other vegetables
Fruits
Miscellaneous
Minerals (" salt " plants).

Most of the wild plants mentioned, and a good many of the cultivated ones, are eaten only very occasionally. Where the use is known to be strictly local, this is indicated in a footnote. When several parts of a plant are used, or it appears in more than one of the lists, cross-references are given after the Zande name.

3. Medicinal and magical uses have as far as possible been separated, the one being entered in List 2 and the other in List 3, but of course the two are often confused.

4. Reference numbers run consecutively through the three lists.

5. The Zande use plant names very loosely. Different informants called the same plant by different names, or applied the same name to different plants. Sometimes differences in usage seem to have a fairly well-defined local application, but by no means always. Many of the names are allusive, *e.g.* " horns of buffalo," or " by the mouth of the hippo " ; such names in particular are liable to be used loosely. Prefixes and suffixes are freely used to associate and distinguish plants considered to be similar in some way. Examples of prefixes are *tita* = grandparent (*i.e.* large), *wiri* = child (*i.e.* small), *kpe* = leaf, *ngua* = tree, *ziga* = antidote; and of suffixes, *di* denoting by the river and *pia* away from the river. The plants thus associated are not necessarily related botanically, though they sometimes are. All these factors contribute to the confusion over names in the various lists I have consulted, and for the present discrepancies seem to be unavoidable.

6. The lists were submitted in draft to the Chief Economic Botanist, Research Station, Wad Medani, for correction of botanical names in accordance with modern nomenclature and determination of a number of specimens. A few of the supplementary items (listed as addenda in the appropriate sections) have not been so submitted.

LIST I

ZANDE FOOD PLANTS

Food Category	No.	Zande Names	Other Names or Description	Botanical Name
Cereals	1	Koko (128)	Sweet dura	Sorghum sp.
	2	Mapunga	Rice	Oryza sp.
	3	Moru (151)	Finger-millet, Telebun	Eleusine coracana Gaer
	4	Ngbaya (154)	Maize	Zea mays L.
	5	Ngiria	Bulrush millet, Dukhn	Pennisetum Typhoides (Burm.) Stapf. & Hubbar
	6	Penzi	Grass	Hyparrhenia sp.
	7	Tudu	Grass	
	8	Vunde	Sorghum, Dura	Sorghum spp.
Starchy Roots and Fruits	9	Abangbe (40)	Sweet potato	Ipomoea batatas Lam.
	10	Akpongodi		
	11	Bagbuza	Herb	Tacca pinnatifida Forst.
	12	Baime		
	13	(Banióngo (Y) (*a*) (Ngbaduge (T)	Wild Yam	Dioscorea schimperiana Hochst ex Kunth.
	14	Bu (97, 142, 236)	Banana, plantain	Musa spp.
	15	Gbanda, Tara (Y) (46)	Cassava, Manioc	Manihot esculenta Crantz
	16	Gbara	Yam	Dioscorea spp.
	17	Manzi	Cocoyam	Xanthosoma sagittifolium Schott.
	18	Mere	Aerial yam	Dioscorea sp. cf. D. bulbifera.
		Addenda		
	18*a*	Bayungumba	Wild yam	Dioscorea dumetorum Pax
Legumes	19	Abakpa	Mung beans, Green gram	Phaseolus mango L.
	20	Abangua	Climbing cowpea	Vigna sp.
	21	(Abapu (Y) (Ayanze (T)	Cowpea	Vigna unguiculata Walp. and other Vigna spp
	22	Abaundu	Earthnut	Voandzeia subterranea Thouars.
	23	Adugo	Pigeon pea	Cajanus cajan Millsp.
	24	Akpokoworo	Lima bean	Phaseolus lunatus L.
		Addenda		
	24*a*	—	Climbing bean	Macuna deeringiana Small
Oilseeds	25	Andeko	Hard simsim	Hyptis spicigera Lam.
	26	Awande	Groundnut, Peanut, Ful Sudani	Arachis hypogaea L.
	27	Bangombe	Cult. climber	Luffa sp.
	28	Besende (43, 70)	Pumpkin	Cucurbita maxima Duchesne
	29	Boko (44, 71)	Pumpkin	Cucurbita maxima Duchesne

LIST I (*Continued*)

	No.	Zande Names	Other Names or Description	Botanical Name
...seeds	30	Datiro	Inedible melon	Citrullus sp.
	31	Inga (47, 72, 263)	Calabash	Lagenaria siceraria (Molina) Standl.
	32	(Koforo (Y) (*b*) (73) (Mbuguru (T)	Cucumber	Cucumis spp.
	33	Kpagu (74)	Gourd	Lagenaria siceraria (Molina) Standl.
	34	Kpakari (102)	Shea nut, Lulu	Butyrospermum niloticum Kotschy.
	35	Mbiro (148)	Oil palm	Elaeis guineensis Jacq.
	36	Nagbanga (55, 76, 265)	Bottle gourd	Lagenaria siceraria (Molina) Standl.
	37	(Nzungu (Y) (59) (Nzungba (T)	Tree	
	38	Sere	Sesame, Simsim	Sesamum orientale L.
	39	Zawa	Meni oil tree	Lophira alata Banks.
		Addenda		
	39*a*	Puse	African breadfruit	Treculia africana Decne.
Leafy Vegetables	40	(Abagambo (Y) (136, 163) (Anyakanyali (T)	Blackjack	Bidens pilosa L.
	41	Abangbe (9)	Sweet potato	Ipomoea batatas Lam.
	42	Bakure	Tree	Pterocarpus lucens Lepr. ex Guill. & Perr.
	43	Besende (28, 70)	Pumpkin	Cucurbita maxima Duchesne.
	44	Boko (29, 71)	Pumpkin	Cucurbita maxima Duchesne.
	45	Danda	Purple-flowered simsim	Sesamum indicum d.
	46	Gbanda, Tara (Y) (15)	Cassava, Manioc	Manihot esculenta Crantz.
	47	Inga (31, 72, 263)	Calabash	Lagenaria siceraria (Molina) Standl.
	48	Kpedekpede	Amaranth, Wild spinach	Amaranthus spp. and Celosia spp.
	49	Kutukpa'gita	Purslane	Portulaca sp.
	50	(Mangayu (*c*) (Zande) (194) (Yango (Balanda)	Herb	Gynandropsis gynandra L. Briq.
	51	Mbazia (196, 229)	Herb	Acrocephalus lilacinus Oliv.
	52	Mboyo (75)	Ladies' fingers, Okra, Bamia	Hibiscus esculentus L.
	53	Morombida	Jew's Mallow, Molokhia	Corchorus olitorius L.
	54	Mvute	Herb	Conyza Aegyptiaca Ait.

LIST I (*Continued*)

Food Category	No.	Zande Names	Other Names or Description	Botanical Name
Leafy Vegetables	55	Nagbanga (36, 76, 265)	Bottle gourd	Lagenaria siceraria (Molina) Standl.
	56	Namba (77)	Red sorrel, Rosella	Hibiscus sabdariffa, L.
	57	Namba zire	Wild rosella	Hibiscus sabdariffa, L.
	58	Nzibi (*d*) (244)	Deccan hemp	Hibiscus cannabinus L.
	59	Nzungu (Y) (37) Nzungba (T)	Tree	
	60	Nzuo	Mock tomato	Solanum spp. including aethiopicum L.
	61	Nzuo bire	Wild mock tomato	Solanum nigrum L.
	62	Serenduka	Herb	
	63	Seresere Sesere	Purslane, Rigla	Portulaca oleracea L.
	64	Sure	Herb	Solanum sp.
	65	Tande (*e*)	Herb	Justicia insularis T. Anders
	66	Vura (268)	Kapok	Ceiba pentandra Gaertn.
	67	Vute		Gynura crepidroides Ben
		Addenda		
	67*a*	Anongba (84,166)	Cucurbitaceous plant	
	67*b*	Riaria (134)	Red pepper, Shatta	Capsicum frutescens L.
	67*c*	Ngaliyo	Swamp plant	
Other Vegetables	68	Bagbodi (259*a*, 271)	Tree	Hymenocardia acida Tul.
	69	Basala	Spring onion	Allium fistulosum
	70	Besende (28, 43)	Pumpkin	Cucurbita maxima Duchesne.
	71	Boko (29, 44)	Pumpkin	Cucurbita maxima Duchesne.
	72	Inga (*f*) (31, 47, 263)	Calabash	Lagenaria siceraria (Molina) Standl.
	73	(Koforo (Y) (32) (Mbuguru (T)	Cucumber	Cucumis spp.
	74	Kpagu (33)	Gourd	Lagenaria siceraria (Molina) Standl.
	75	Mboyo (52)	Ladies' fingers, Okra, Bamia	Hibiscus esculentus L.
	76	Nagbanga (*f*) (36, 55, 265)	Bottle gourd	Lagenaria siceraria (Molina) Standl.
	77	Namba (56)	Red sorrel, Rosella	Hibiscus sabdariffa L.
	78	Tamatim	Tomato	Lycopersicum esculentum Mill.
Fruits	79	Abanga Mbiri	Tree	Canarium schweinfurthii Engl.
	80	Abangba	African locust bean	Parkia filicoidea Welw.
	81	Abanza	Tamarind	Tamarindus indica L.

LIST I (*Continued*)

Food Category	No.	Zande Names	Other Names or Description	Botanical Name
Fruits	82	Akua (133, 230) Ambassa	Borassus, Doleib	Borassus flabellifer L.
	83	Ananas	Pineapple	Annas comosus L.
	84	Anongba (67*a*, 166)	Cucurbitaceous plant	
	85	Anzeri (131)	Tree	Irvingia sp.
	86	Bagara (168, 260)	Wild custard apple	Annona senegalensis Pers.
	87	Bagipara Ndairoko Ndasu	Wild fig	Ficus sp. cf. F. capensis Thunb.
	88	Bakakwe (231)	Wild climber	Cissus populnea G. & P.
	89	Bambiso di Sendembori	Tree	Syzygium guineense DC.
	90	Bambiso pia (Y) Kpakpa (T)	Tree	Syzygium sp.
	91	Bamugu (273)	Herb	Acanthaceae
	92	Bandemi (*g*) Banyikoro	Tree	Prob. Parinari curatellifolia Planch.
	93	Barangbabaango	Wild cucurbit	
	94	Birikito (268*b*) Kanganongu Ngunge	Tree	Vitex cuneata Schum. & Thonn.
	95	Birikito ambiri	Tree	Vitex madiensis Oliv.
	96	Borodukani	Tangerine, Mandarin	Citrus nobilis Lour.
	97	Bu (14, 142, 236)	Banana	Musa spp.
	98	Gangalingo	Shrub	Carissa edulis Vahl.
	99	Gbarakuri (185,279)	Shrub	Asparagus racemosus Willd.
	100	Gengere (144,188)	Wild climber	Prob. Ampelocissus cinnamochroa Planch.
	101	Guava	Guava	Psidium guajava L.
	102	Kpakari (34)	Shea nut, Lulu	Butyrospermum niloticum Kotschy.
	103	Kpazamangu (246)	Shrub	Securinega virosa (Roxb.) Baill.
	104	Kpokpogi Rindikiwe	Shrub	Carissa edulis Vahl.
	105	Kpoyo (132*a*, 147, 268*c*, 281)	Tree	Grewia mollis Juss.
	106	Lolo	Tree	
	107	Manga	Mango	Mangifera indica L.
	108	Mbiombio (240)	Wild climber	Uvaria bukobensis Engler.
	109	Mbuma	Cape gooseberry	Physalis peruviana L.
	110	Mvuruma (130)	Wild fig	Ficus vallis-Choudae Del.
	111	Ndevu	Wild rubber	Landolphia florida Benth.
	112	Ndimu	1) Lime, 2) Lemon	Citrus medica L. 1) Subvar. acris 2) Subvar. Limetta Risso.

LIST I (*Continued*)

Food Category	No.	Zande Names	Other Names or Description	Botanical Name
Fruits	113	Ngbakasabamu	Shrub	Ximenia americana L.
	114	Ngorondima	Tree	Zyzyphus mauritania Lam.
	115	Nonga (258)	Wild cardamom	Amomum korarima Pereira
	116	Oranji	Orange	Citrus aurantium L. var. sinensis Gall. Citr.
	117	Papai	Pawpaw	Carica papaya L.
	118	Puse (transferred to 39*a*)		
	119	Rindiseke (161, 206)	Shrub	Phyllanthus floribundus Muell. Arg.
	120	Sendembori	see No. 89	
	121	Sikisa (245) Kingo	Palm	Phoenix reclinata Jacq.
	122	Titaroko	Wild fig	Ficus sp.
	123	Tutu	Mulberry	
	124	Vundoro		
	125	Warawarakpa (270)	Wild rubber	Landolphia owariensis Beauv.
Miscellaneous		*Fungi*		
	126	Rute	Mushrooms	
	127	Akpangi	Edible fungus	(Grows on rotting stumps of Acacia campylacantha).
		Stems		
	128	Koko (1)	Sweet sorghum, Sweet dura.	Sorghum sp.
	129	Ngongoli	Sugarcane	Saccharum officinarum L.
	130	Mvuruma (110)	Wild fig	Ficus vallis-Choudae Del.
		Broth Ingredients		
	131	Anzeri (85)	Tree	Irvingia sp.
	132	Gbadangi	Wild climber	Cissus populnea G. & P.
	132*a*	Kpoyo (105, 147, 268*c*, 281)	Tree	Grewia mollis Juss.
		Young root Bark		
	133	Akua (82, 230) Ambassa	Borassus, Doleib	Borassus flabellifer L.
		Flavourings		
	134	Riaria (67*b*)	Red pepper, Shatta	Capsicum frutescens L.
	135	Nana	Mint	Mentha viridis
Minerals (" Salt " Plants)	136	Abagambo (Y) (40, 163). Anyakanyali (T)	Blackjack	Bidens pilosa L.
	137	Ahia	Reed	Scleria racemosa Poir
	138	Apaya	Reed	Cyperus auricomus Sieber ex Spreng.
	139	Bavurubate (Y) Tita ngbiringbiri (T)	Shrub	Microglossa volubilis DC.

LIST I (*Continued*)

Food Category	No.	Zande Names	Other Names or Description	Botanical Name
Minerals ("Salt" Plants)	140	Bingba (180, 248*c*)	Speargrass	Imperata cylindrica Beauv. L.
	141	Bodumo (235)	Papyrus	Cyperus papyrus L.
	142	Bu (14, 97, 236)	Banana, Plantain	Musa spp.
	143	Bubu	Swamp plant	Kaempferia sp. cf. K. macresiphon Bak.
	144	Gengere (100, 188)	Wild climber	Prob. Ampelocissus cinnamochroa Planch.
	145	Kiriwa	Cult. fence shrub	Jatropha curcas L.
	146	Kpakpa (Y) (239, 264) Matangbu (T) Nganzirangbanguru Nzawa	Tree	Dombeya quinqueseta (Del.) Exell.
	147	Kpoyo (105, 281)	Tree	Grewia mollis Juss.
	148	Mbiro (35)	Oil palm	Elaeis guineensis Jacq.
	149	Mongua (Y) Maua (T)	Shrub	Gymnosporia senegalensis Lam.
	150	Morongbiti	Reed	Vossia cuspidata Griff.
	151	Moru (3)	Finger-millet Telebun	Eleusine coracana Gaertn.
	152	Mukpo	Herb	Prob. Asteracanthus longifolia (L.) Nees.
	153	Ngaliyo	Swamp plant	
	154	Ngbaya (4)	Maize	Zea mays L.
	155	Ngbiringbiri (199, 247)	Tree	Ethulia coryzoides L.
	156	Pangbadupo	Water lettuce	Pistia stratiotes L.
	157	Pangbangondi	Swamp shrub	Mimosa pigra L.
	158	Rangbe	Grass	Prob. Setaria chevalieri Stapf.
	159	Rekondo	Grass	Commelina benghalensis L.
	160	Rikpanda		Sida rhombifolia L.
	161	Rindiseke (119, 206)	Shrub	Phyllanthus floribundus Moell. Arg.
	162	Tande	Herb	Justicia calcarata Hochst.

(*a*) Y = Yambio, T = Tambura.
(*b*) Bitter variety grown entirely for its seeds.
(*c*) Eaten only by Balanda.
(*d*) Eaten only by Balanda. Zande grow it only for fibre.
(*e*) Not to be confused with the commoner *tande* (Justicia calcarata) used for "salt."
(*f*) Only non-bitter varieties eaten.
(*g*) Obscene reference to unpleasant smell of leaves when crushed.

LIST II

SOME ZANDE MEDICINE PLANTS

No.	Zande Name	Other Names or Description	Botanical Name
163	Abagambo (Y) (*a*) (40) Anyakanyali (T) (136)	Blackjack	Bidens pilosa L.
164	Aduruko (226)	Shrub	Piper guineense Schumach
165	Agundu	Herb	Ocimum americanum L.
166	Anongba (67*a*, 84)	Cucurbitaceous plant	Ocimum americanum L.
167	Azuangi	Tree	
168	Bagara (86, 260)	Wild custard apple.	Annona senegalensis Pers.
169	Bakaikpa (249)	Tree	Terminalia splendida Engl. and Diels.
170	Bakatura (214)	Woody herb	Solanum incanum L.
171			
172	Bakaya (261)	Shrub	
173	Bambiri	Tree	Albizzia zygia Macbride.
174	Bangiribakike (252)	Shrub to tree	Erythrina tomentosa R. Br.
175	Bangirimvuru Biribasa	Shrub	Clerodendron cordifolium A. Rich.
176	Bangiringama	Herb	Prob. Acanthaceae
177	Batari	Shrub	Rhus natalensis Bernh.
178	Bavutire (248*b*)	Tree	Daniellia oliveri (Rolfe) Hutch. & Dalziel.
179	Bawirisango	Tree	Stereospermum kunthianum Cham.
180	Bingba (240,248*c*)	Speargrass	Imperata cylindrica Beauv.
181	Dakadia	Tree	Combretum sp.
182	Dama (276)	Tree	Nauclea latifolia Sm.
183	Gasiambara	Tree	Combretum gueinzii Sond.
184	Gbangagbe (278)		Gloriosa simplex L.
185	Gbarakuri (99, 279)	Shrub	Asparagus racemosus Willd.
186	Gbugari (280)	Tree	Crossopteryx febrifuga Benth.
187	Gbunga	Castor oil plant	Ricinus communis L.
188	Gengere (100,144)	Wild climber	Prob. Ampelocissus cinnamochroa Planch.
189	Gorokurungba	Tree	Paullinia pinnata L.
190	Humugbe	Herb	Kosteletskya grantii (Mast) Gurke
191	Kubokubo		Kalanchoe modesta Kotschy & Peyr.
192	Kuma (224)	Tree	Caloncoba schweinfurthii Gilg.

LIST II (*Continued*)

No.	Zande Name	Other Names or Description	Botanical Name
193	Makpama	Herb	Ocimum americanum L.
194	Mangayu (Zande) (50) Yango (Balanda)	Herb	Gynandropsis gynandra L. Briq.
195	Mataria	Wild climber	Prob. Omphalogonus calyphyllus Baillon.
196	Mbazia (51, 229)	Herb	Acrocephalus lilacinus Oliv.
197	Mvuowere	Lemon grass, Citronella.	Cymbopogon nardus.
198	Ngbege (257, 266)	Wild gardenia	Gardenia erubescens Stapf. & Hutch.
199	Ngbiringbiri (155, 247)	Tree	Ethulia conyzoides L.
200	Ngurunza	Tree	Acacia campylacantha
201	Nzemekingoro		
202	Nzere	Shrub to tree	Phyllanthus discoideus Muell. Arg.
203	Parabaso	Shrub	Prob. Acalypha villicaulis Hochst. ex A. Rich.
204	Ranga	Bulbs in general	
205	Rangburangbu	Sausage tree	Kigelia aethiopica Decne.
206	Rindiseke (119, 161)	Shrub	Phyllanthus floribundus Muell. Arg.
207	Tomedari	Tree	Euphorbia sp.
208	Tukuri	Wild climber	
209	Udipia	Shrub	Securidaca longipedunculata Fresen.
210	Wakayu		Aspilia Kotschy Benth. & Hook f.
211	Zambara	Tree	
212	Ziga	Creeping herb	Portulaca sp.
213	Zigagarawa (Y) Imasagarawa (T)	Shrub	Acalypha villicaulis Hochst. ex. A. Rich.
	Addenda		
213*a*	Gero	Tree	Erythrophlaeum guineense Don.
213*b*	Kitika	Herb	Oxalis corniculata L.

(*a*) Y = Yambio, T = Tambura.

LIST III

SOME OTHER USEFUL PLANTS

Use	No.	Zande Names	Other Names or Description	Botanical Name
Poisons (*a*)	214	Bakatura (170)	Woody herb	Solanum incanum L.
(i) *Arrow*	215	Giango	Tree	Euphorbia venenifica Trem.
	216	Riga	Bulb	
(ii) *Fish*	217	Baranga (*b*)	Aloe-like herb	Sanseviera abyssinica N.E. Brown
	218	Gbururi (*b*)		
	219	Kundubaderi (*b*)	Bulb	
	220	Makiriga	Shrub	Randia nilotica Stapf.
	221	Makoko Nguru	Shrub	Tephrosia vogelii Hook.
	222	Mirizigba	Herb	Anthericum tryphyllum Bak.
	223	Nge (*b*) (268*e*) Nzengere	Tree	Prosopsis africana (G. & P.) Taub.
(iii) *Bees*	224	Kuma (192)	Tree	Caloncoba schweinfurthii Gilg.
(iv) *Termites*	225	Seribasi	Shrub	
Perfumes	226	Aduruko (164)	Shrub	Piper guineense Schumach
	227	Agbagi	Reed	Jardinea congoensis Franch.
	228	Akuki	Reed	Cyperus articulatus L.
	229	Mbazia (51, 196)	Herb	Acrocephalus lilacinus Oliv.
Fibres	230	Akua (82, 133) Ambassa	Borassus, Doleib	Borassus flabellifer L.
	231	Bakakwe (88)	Wild climber	Cissus populnea G. & P.
	232	Batingbarama	Swamp plant	Thalia geniculata L.
	234	Bisima	Reed	
	235	Bodumo (141)	Papyrus plant	Cyperus papyrus L.
	236	Bu (14, 97, 142)	Banana, Plantain	Musa spp.
	237	Dakpa (262, 275) Kau	Tree	Pileostigma reticulata (DC Hochst.
Fibres	238	Gai (277)	Reed	Costus afer Ker-Gawl.
	239	Kpakpa (Y) (*c*) (146, 264) Matangbu (T) Nganzirangbanguru Nzawa	Tree	Dombeya quinqueseta (Del Exell.
	240	Mbiombio (108)	Wild climber	Uvaria bukobensis Engler
	241	Mvue	Swamp plant	Thalia geniculata L.
	242	Nzawa di Nzawa gbanda	Swamp plant	Clappertonia ficifolia (Willd.) Decne.

LIST III (*Continued*)

Use	No.	Zande Names	Other Names or Description	Botanical Name
Fibres	243	Nzawa pia		Urena lobata L.
	244	Nzibi (58)	Deccan hemp	Hibiscus cannabinus L.
	245	Sikisa (121) Kingo	Palm	Phoenix reclinata Jacq.
		Addenda		
	245*a*	Kpudu	Rattan cane	Calamus curcas
	245*b*	Wida	Tree	Odina barteri Oliv.
Building	246	Kpazamangua (103)	Shrub	Securinega virosa (Roxb.) Baill.
	247	Ngbiringbiri (155, 199)	Tree	Ethulia conyzoides L.
	248	Nganzidupo (268*d*)	Swamp grass	Phragmites communis Trin.
		Addenda		
	248*a*	Banga	Tree	Anogeissus leiocarpus Guill. & Perr.
	248*b*	Bavutire (178)	Tree	Daniellia oliveri (Rolfe) Hutch. & Dalziel.
	248*c*	Bingba (140, 180)	Speargrass	Imperata cylindrica Beauv.
Drums	249	Bakaukpa (169)	Tree	Terminalia splendida Engl. & Diels.
	250	Bagu	Mahogany	Khaya senegalensis A. Juss. and K. grandifoliola C. DC.
Personal wear and ornament	251	Bagadi	Barkcloth tree	Ficus glumosa Del.
	252	Bangiribakike (174)	Shrub to tree	Erythrina tomentosa R. Br.
	253	Kato (*d*)	Wild cotton	Gossypium barbadense L. var. brasiliense.
	254	Pupuki	Grass	Urelytrum giganteum Pilger.
Dyes	255	Birikpo	Tree	Randia mallifera Benth. & Hook. f.
(i) *Bodily Decoration*	256	Mbongo	Wild gardenia	Gardenia vogelii, Hook. f.
	257	Ngbege (198, 266)	Wild gardenia	Gardenia erubescens Stapf. & Hutch.
	258	Nonga (115)	Herb	Amomum korarima Pereira.
	259	Rimama		

LIST III (*Continued*)

Use	No.	Zande Names	Other Names or Description	Botanical Name
(ii) *Other*		*Addendum*		
	259*a*	Bagbodi (68, 271)	Tree	Hymenocardia acida Tul.
Various Domestic Purposes	260	Bagara (86, 168)	Wild custard apple.	Annona senegalensis Pe
	261	Bakaya (172)	Shrub	
	262	Dakpa (237, 275) Kau	Tree	Pileostigma reticulata (D Hochst.
	263	Inga (31, 47, 72)	Calabash	Lagenaria siceraria (Molin Standl.
	264	Kpakpa (Y) (146, 239) Matangbu (T) Ngazirangbanguru Nzawa	Tree	Dombeya quinqueseta (Pel.) Exell.
	265	Nagbanga (36, 55, 76)	Bottle gourd	Lagenaria siceraria (Molin Standl.
	266	Ngbege (198, 257)	Wild gardenia	Gardenia erubescens Stap & Hutch.
	267	Sabuna pia		
	268	Vura (66)	Kapok	Ceiba pentandra Gaertn.
		Addenda		
	268*a*	Bakiwe	Tree	Morelia senegalensis A. Rich.
	268*b*	Birikito (94) Kanganonga Ngunge	Tree	Vitex cuneata Schum. & Thonn.
	268*c*	Kpoyo (105, 132*a*, 147, 281)	Tree	Grewia mollis Juss.
	268*d*	Nganzidupo (248)	Swamp grass	Phragmites communis Trin.
	268*e*	Nge (223) Nzengere	Tree	Prosopsis africana (G. & P Taub.
Miscellaneous Products	269	Gbakoro (*e*)	Tobacco	Nicotiana tabacum L.
	270	Warawarakpa (125)	Wild rubber	Landolphia owariensis Beauv.
		Addendum		
	270*a*	Bangi	Indian hemp, Hashish	Cannabis sativa L.
Magic	271	Bagbodi (68, 259*a*)	Tree	Hymenocardia acida Tul.
	272	Bamangana	Herb	Amomum polyanthum Schumann.

LIST III *Continued*

Use	No.	Zande Names	Other Names or Description	Botanical Name
agic	273	Bamugu (91)	Herb	Acanthaceae
	274	Bawia	Sensitive plant	Biophytum petersianum Klotszch.
	275	Dakpa (237, 262) Kau	Tree	Pileostigma reticulata (DC.) Hochst.
	276	Dama (182)	Tree	Nauclea latifolia Sm.
	277	Gai (238)	Reed	Costus afer Ker-Gawl.
	278	Gbangagbe (184)		Gloriosa simplex L.
	279	Gbarakuri (99, 185)	Shrub	Asparagus racemosus Willd.
	280	Gbugari (186)	Tree	Crossopteryx febrifuga Benth.
	281	Kpoyo (105, 132*a*, 147, 268*c*)	Tree	Grewia mollis Juss.
	282	Mere anya	Wild aerial yam	Dioscorea bulbifera L.
	283	Nzati	Herb	Pupalia lappacea Juss.
	284	Ranga	Bulbs in general	
	285	Sarawa	Herb	
	286	Araka	Wild climber	Cissus sp.

(*a*) (iii) and (iv) and at least some of those in (ii) stupefy rather than poison.

(*b*) Recorded among Balanda only.

(*c*) Y = Yambio, T = Tambura.

(*d*) The lint = remu ; the cloth = roko

(*e*) The dried tobacco = gundo.

APPENDIX II

NOTES ON PRODUCTION, STORAGE AND UTILISATION OF ZANDE FOODS[1]

CEREALS

ELEUSINE (3)

General

Zande: Main grain crop but no longer staple food. Degree of replacement by cassava varies, being apparently less advanced in south than north. In survey groups, highest in Taba (intermediate between peasant and wage economy) and in wage-earning groups. Suffers through high labour-costs, both cultural and domestic, in comparison with cassava. It has also been pointed out that the first resettlement for sleeping-sickness control, removed the population from sites along streams to higher land less suitable for this crop.

Balanda: Main grain crop, but acreage smaller and yields lower (to judge by appearances) than further south. Trend in relation to cassava unknown.

Varieties

Mixed in field and cooking-pot. No consumer preferences expressed.

Cultivation

Zande: Small plots may be sown very early, especially by families whose stocks are low. A very few people even clear some patches of low-lying land in the dry season for raising a small early supply, sown February-March, reaped June-July. Main crop sown June, July, August and first half September, though 31st August is regarded as latest safe date. Starting and finishing dates vary in different places. Actually recorded as late as 26th September at Taba, whereas at Madi reaping was beginning then on earliest plots. Other crops inter-planted: cassava, sesame, hyptis, maize, sorghum. Proportion which followed groundnuts was 34% Ukua, 8.5% Momboi, 9% Taba. Main harvest from end September onwards according to sowing-dates. Most in November-December. May be grown three years in succession on same land.

Balanda: Sown June-August; none follows groundnuts. Crops interplanted: cassava, hyptis, deccan hemp, bulrush millet, sorghum, legumes. (Late maize not grown in this area.)

Storage

In head, in grainstore. Keeps well for several years.

Utilisation

Ground to flour for porridge, or malted for beer. Used as malt for any kind of beer. Chaff burnt for potash.

Treatment

(*a*) *Threshing*: Large quantities flailed with sticks and winnowed in shallow baskets. Small quantities pounded in mortar and similarly winnowed.

(*b*) *Flour*: Roasted, pounded to loosen husks, winnowed, ground.

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(1) Numbers after crop names refer to plant list in Appendix I.

(c) *Porridge* : stiff or soft (pap). Latter rare. As for any flour.
(d) *Malt* : Grain put in water overnight, left in covered basket 2-3 days till well sprouted. Dried in sun. Stored till required.
(e) *Beer* : See Section IX.
(f) *Soured pap* : for children and nursing mothers. See under Cassava.
(g) *Potash* : See under Minerals.

SORGHUM (8)

General

A very minor crop among the Zande. As important as eleusine among the Balanda.

Varieties

No data on culinary qualities, except that *manghagu* is said to be no good for beer.

Cultivation

Zande : (a) Sown among early maize in April for harvest in December. (b) *Manghagu* sown in July among first-sown eleusine to give small crop in December, when it is cut down to throw up ratoons in first rains and give its best crop in July, after which it is uprooted.

Balanda : Sown in April-May, close round homesteads to facilitate bird-scaring. Interplanted with cassava, sweet potatoes and miscellaneous food plants. Said to be grown for 5-6 years or more on same land, the trash being burnt on it shortly before planting. A little sown among eleusine. Harvest December.

Storage

Zande : In head; often mixed up with eleusine in the store. Complaints of speedy insect attack unless threshed and stored in smoky place.

Balanda : In head in grainstore. No complaints of insect attack; will keep round the year.

Utilisation

Zande : Ground to flour for porridge, usually mixed with eleusine. *Kisra* very occasionally made in more sophisticated homes.

Treatment

(a) *Threshing* : As eleusine.
(b) *Flour* : Dry method as eleusine. Wet method: pounded to loosen husks, winnowed, put in water overnight, ground wet, set aside for another night, sun-dried. It dries in small lumps which are easily ground down to flour. This method, preferred as being easier grinding, gives a slightly sour taste to the flour which is liked.
(c) *Porridge or pap* : As for any flour.
(d) *Kisra* : Made of a pouring batter of flour and water, left to soak anything from a few hours to 2-3 days, undergoing acid fermentation. Spread thinly on very hot iron sheet well greased, left for about half a minute, peeled off as thin soft wafer. Served as main dish with stew or sauce. May be sun-dried for taking on a journey.

MAIZE (4)

General

An important secondary cereal among the Zande, declining to a minor food northwards from Tambura.

Varieties

No consumer preferences expressed.

Cultivation

Zande: Main crop sown March-April, mostly interplanted with early groundnut crop, but a little in pure stand on particularly good patches of ground such as mounds of old house-sites. Small amounts, usually the first to be planted, are grown in the homesteads on ridges thrown up round the compound. A very few people plant little patches on low-lying damp land as early as February, for eating from May onwards. Main harvest, July. A late crop of varying importance is planted serially among the eleusine and harvested from October onwards.

Balanda: One crop only, planted April, ripens August.

Storage

Cobs in sheath hung up in bundles on trees or racks in compounds. Left till rain starts again in earnest, when what remains after sowing is taken in and eaten. Heavily weevilled by that time. Cobs set aside for seed may be strung up round the apex of the roof of hut or store until thoroughly dry, and then hung inside where smoke will reach them. Where no reason to fear depredations, cobs may be left on plants as long as 2 months after ripening, till a convenient time to bring them in.

Utilisation

Zande: For food: on cob, green or ripe, or as flour (rare). For beer, malted with eleusine. Bulk of crop reserved for beer. Cobs and waste burnt for potash.

Balanda: Mostly eaten as it ripens; rarely used for beer.

Treatment

(*a*) *On cob*: Roasted or, less commonly, boiled while green or newly ripe.

(*b*) *Whole grain*: When too dry for eating on cob, grain may be removed and boiled whole, especially for making a dish of cowpeas and maize cooked together.

(*c*) *Flour*: Dry method reported among Congo Zande not seen. Grain soaked 12-24 hours, and ground or pounded wet. Two more sophisticated methods in Appendix III.

(*d*) *Porridge or pap*: As for any flour. Pap, slightly sour-tasting, is eaten alone as a rather special treat. Stiff porridge eaten with usual side dishes. Both are rare.

(*e*) *"Bread"* (*kpakutà*): Stiff dough of flour and water shaped into long rolls, tied up in banana leaves, put into warm water and covered with more banana leaves, boiled one hour. Eaten hot or cold, alone or with paste of groundnuts or sesame. Honey or mashed ripe bananas may be mixed in the dough. Special purpose, for a journey.

(*f*) *Kisra*: As sorghum, q.v. Found in sophisticated homes only, when no sorghum available.

(*g*) *Beer*: See Section IX.

(*h*) *Potash*: See under Minerals.

RICE (2)

General

A very minor food. A few tiny patches of dry rice were seen in Ukua and Momboi, and fewer still in Madi and Taba; none further north. Introduced from Congo only in last few years, but rapidly finding favour among cultivators on the richer soils south of Yambio.

Cultivation

Sown in June in plots of 100-200 sq. yds. only, in the miscellany round the houses. Favourite sites, ant-hills. Harvested October-November.

Storage

In husk. Hulled as required for use.

Utilisation

As a very occasional replacement for the usual porridges.

Treatment

Put into cold water, brought to boil and cooked till soft. Amount of water judged so as to be all absorbed. May be served with honey or, in sophisticated homes, sugar; or be cooked with salt for serving with meat or fish stew.

BULRUSH MILLET (5)

Zande: An occasional interplant in eleusine fields. Stored and used along with eleusine.

Balanda: Small amounts interplanted in eleusine. All mature heads seen 1947 heavily infected with a black mould. Some informants claimed it as main staple in their childhood, abandoned for cultural reasons after appearance of certain weeds. Stored and used with eleusine and sorghum.

SWEET SORGHUM (1, 128)

General

A sweet-stemmed sorghum grown as part of the miscellany round the houses. Balanda grow larger amounts than Zande.

Cultivation

Zande: Sown in April with early maize. Cut green for chewing from July onwards, a small secondary growth springing up from those plants cut early while rain still plentful. A little allowed to mature for seed, harvested December. Another variety, reported common in south and east, ratoons like *mangbagu* (see under Sorghum) and give its best crop in the following June and July.

Balanda: As main sorghum crop.

Storage

Mature heads stored as other sorghums.

Utilisation

Zande: Cut green during latter half of rains particularly September-October, and the stem chewed for its sweet juice.

Balanda: As Zande, but some also allowed to mature and the grain mixed with other sorghum for beer.

PENZI (6), *TUDU* (7)

General

Wild grasses found only in hills about forty miles north of Tambura. Produce edible seeds, not unlike rice. Said to be cooked like rice.

Season, July. The Balanda of the immediate neighbourhood collect and eat both during a short season. Relished as a change from porridge, a certain amount being sent in to the Chief in Tambura.

STARCHY ROOTS AND FRUITS

CASSAVA (15)

General

Zande: Main staple of diet. Increasingly replacing eleusine, most extensively in Tambura area and in certain groups affected by wage-earning. Has overstepped its valuable and legitimate function in the food economy, viz. a reserve against bad harvests and a stand-by for the pre-harvest period.

Balanda: Firmly established here also, figuring more prominently in homestead and diet than had been expected. Tides over marked scarcity period before grain harvest, but position needs watching here too for signs of decline in grain acreage, *i.e.* replacement instead of supplementation.

Varieties

Bitter, requiring preparation to remove toxic element. Sweet, which can be eaten fresh. Preferences relate to speed of maturing and resistance to mosaic, not to differences in cooking qualities or taste. *Gbazamangi* (27 months) in south, *karangba* (15 months) in north, are commonest bitter varieties. *Mavu ende* or *mope* (9 months) is commonest sweet variety everywhere.

Cultivation

Zande: Planted widely spaced through any other crops, and in second year may be underplanted with eleusine. Sweet varieties usually concentrated near houses, to be readily at hand when needed, and because most liable to depredations by wild pigs. Long-standing varieties left to fend for themselves in long grass in later stages. Planting throughout rainy season, harvest any time. No steps taken to protect from bush fires.

Balanda: Similar cultivation but, except for *karangba* which is exceptionally bitter and said to be poisonous to wild pigs, not much planted in fields at any considerable district from homesteads. Plant growth less luxuriant than further south, with none of the abundant volunteer growth from old cultivations often seen among the Zande.

Utilisation

Bitter or sweet kinds dried for flour, and often mixed with eleusine. Sweet kinds roasted or boiled, as the chief stand-by or extra food for satisfying hunger. Cassava fibres used as make-weight in inferior beer, and may be combined with malted eleusine to make fermented pap for children and nursing mothers. Leaves (*gadia*) eaten in dry season or very early rains when more popular kinds not well available.

Treatment

(*a*) *Flour*: Tubers soaked for several days, pounded to wet pulp (*bamukandi*), set aside for 24 hours, sun-dried into small lumps which are ground to flour as required, or may be sold.

(*b*) *Porridge, or pap*: As for any flour.

(*c*) "Bread" (*kpakuta*): Wet cassava pulp may be prepared like maize bread, q.v.

(*d*) *Fresh tubers* : Roasted or boiled, with or without their skins. Eaten alone or dipped into a paste or sauce.
(*e*) *Leaves* : See under Leafy Vegetables.
(*f*) *Beer* : See Section IX.
(*g*) *Soured pap* : Cassava fibres made into a sort of porridge, cooled, mixed with cold water and malted eleusine, and allowed to stand overnight.

SWEET POTATOES (9)

General

Important secondary staple during half the year. Regarded as a woman's crop.

Varieties

Mostly white or with red skins only. Varietal names confused; many people could not name the varieties they were growing. Preferences apparently based on sweetness.

Cultivation

Zande : Patches interplanted in the garden miscellany, any time during the rains. Once established, they carry on by volunteer growth from year to year. Harvest September to March or April. Usually planted on flat and allowed to creep where it will but the more energetic throw up heaps or ridges and get a greater yield. When rains set in, remaining crop must be lifted quickly to prevent rotting in the ground.

Balanda : Similar, but little if any carry-over by volunteer growth, and cultivation tends to be in rather better defined plots than among the Zande.

Storage

Lifted as required, will not store except as *akpakarakpi* = dried slices.

Utilisation

Tubers eaten alone or dipped in a paste or sauce, in place of porridge or as an extra food for satisfying hunger, like fresh cassava. Leaves eaten chiefly in dry season and very early rains when more popular kinds not available.

Treatment

(*a*) *Fresh tubers* : Most commonly boiled unseasoned, before or after peeling. Also roasted in ashes.
(*b*) *Akpakarakpi* : Tubers peeled, cut in thin slices and sun-dried. When required, put in water and boiled.
(*c*) *Leaves* : As other leafy vegetables, q.v.

YAMS (13, 16, 18, 18*a*)

General

A subsidiary food used irregularly and seasonally in place of porridge. Not to be compared in importance with sweet potatoes. Regarded as a woman's crop.

Varieties

Wild and cultivated. Cultivated yams mostly seen as single plants growing over a tree in the compound, but occasionally in greater

numbers grown as fence or on the ridge surrounding the compound. Certain wild yams seldom used except in time of hunger. Preference in cultivated yams said to relate to yields and not to flavour or cooking qualities.

Cultivation

Perennial. Planted at time of lifting in dry season. Harvest cultivated yams, dry season; wild yams, October to December and March to May.

Storage

None.

Utilisation

Tubers for food.

Treatment

(*a*) *General*: Boiled or roasted; eaten alone or, rarely, dipped in a paste or sauce.

(*b*) *Bayungumba*: Toxic unless specially treated. Boiled, peeled, sliced finely, and put in basket in flowing water for 3 days to wash out bitterness. May then be eaten as it is, or dried and stored. To cook after drying, boiling water poured on and allowed to stand a few minutes. May then be eaten alone or mixed with sesame or groundnut paste or honey. Alternative method of treatment—boiled first, then soaked in cold water one day and water thrown away, after which ready for eating.

OTHER STARCHY ROOTS (10, 11, 12, 17)

Akpongodi, bagbuza, baime, manzi

General

Foods of very occasional use, once or twice in a year probably. *Cocoyams* (*manzi*) seen in many homesteads, but seldom more than a single clump and all Xanthosoma. Colocasia not seen anywhere except Yubu Station. Regarded as a woman's crop.

Utilisation

Tubers boiled and eaten alone.

BANANAS (14)

General

Universally grown by southern Zande, less extensively in the Tambura Sub-District and very little in the northern area. A subsidiary food in infrequent and irregular use in peasant homes. Particularly a travellers' food, also readily bought by wage-earners.

Varieties

Many. Preferences based on flavour. Some men still believe that eating the dwarf *tingitingi* will make them impotent, but the idea appears to be losing ground.

Cultivation

Grown round homesteads, planted first half of rains. Garden rubbish may be piled up round the base but only erratically, although the value of this practice is recognised. The bottom of an old borrow-pit or other depression is regarded as a good site. Harvested intermittently throughout year, chiefly during dry season and on into April. Yields seem extremely poor with bunches of very few hands, due to lack of mulching.

Storage

None.

Utilisation

Fruit for food. Leaves and waste burnt for potash. Fibres used for string. Leaves sometimes made into fringed skirts for women.

Treatment

(a) *Ripe fruit*: Eaten raw, or occasionally mashed in maize or cassava "bread," q.v.

(b) *Cooked*: *Bagbagiza*, *Bangerekuavi*, *Ridingondi* and possibly others may be boiled and eaten in place of porridge. If unripe, boiled in skins; ripe, peeled first.

(c) *Potash*: See under Minerals.

PULSES

PEAS AND BEANS (19-24)

Mung beans, cowpeas, earthnuts, pigeon peas (very rare), lima beans.

General

Very small amounts grown, for eating during a short season at harvest and sporadically thereafter. More found among Balanda, but still a minor food. Pigeon peas a recent introduction by Agricultural Department.

Varieties

Several of cowpeas. Individual preferences for different pulses vary.

Cultivation

Zande: Tiny plots of 100-200 sq. yds. grown near homesteads or in main fields, and scattered interplanting among other crops. If sown in large plots fungus diseases apt to wipe out whole plots of cowpeas and mung beans in few days. Plots may occasionally be mixed, *e.g.* mung beans and cowpeas, or mung beans and hyptis (see under Oilseeds). Earthnuts most commonly planted as edging to patches of groundnuts; believed to discourage ground squirrels in search of groundnuts. Climbing legumes grown over trees in homesteads or fields. Single bushes of pigeon peas very occasionally seen in homesteads. Planted June and July, harvest September to November; picking starts while still green. Earlier planting causes spoilage by excessive grain in later stages of crop.

Balanda: Cultivation similar to Zande but more sizable patches seen in main fields, even up to half acre in big families.

Storage

In pod or shell. All get heavily weevilled in a month or two, except mung beans which store well. Seed reserve sometimes seen stored in bottle gourds securely stoppered, or wrapped in grass or leaves and hung in a smoky place, but these precautions not universal and many people short of seed through storage losses. Storage in ashes unknown.

Utilisation

Seeds, half or fully ripe, used for food.

Treatment

(a) *Half ripe*: Cowpeas—boiled in pod, shelled and eaten alone. Or may be shelled first. Lima beans—shelled, boiled, skin removed, boiled again and combined with a sauce, for eating with porridge.

(*b*) *Ripe*: All kinds—shelled and boiled in plenty of water, salt added if liked. Cowpeas and mung beans may be cooked together, or cowpeas and whole maize. Water drained off. Surplus water from peas and beans often drunk because it is "sweet." Peas and beans make a soft mash, earthnuts remain harder and more distinct. Eaten alone.

(*c*) *Sauce* (*apirinda*): Dry cowpeas or lima beans roasted, pounded and skins winnowed off, mixed in cold water, brought to boil, sesame or groundnut paste and seasoning added, boiled again till well cooked. Served as sauce to eat with porridge.

OILSEEDS

GROUNDNUTS (26)

General

Zande: Principal oilseed. Frequency of use rivals cassava and nutritional importance in the diet cannot be over-estimated, especially with such a poor quality staple as cassava. Production for home consumption needs considerably increasing to level up supplies through year before any should be regarded as surplus to local requirements. The new cotton rotation encourages this, because every old cotton plot is land ready cleared for groundnuts at start of new season. Only women weed groundnuts; this, and possibly similar restriction on harvesting, limits area.

Balanda: Secondary to sesame, also a valuable food-stuff.

Varieties

At least four. *Mangirima*, giving four red nuts, a fairly recent introduction from Congo, are very popular because they mature more quickly and are said to contain more oil than ordinary Zande nuts (2 seeds, small). *Mangirima* therefore specially sought after for planting on land intended for eleusine afterwards.

Cultivation

Zande: Fields of nuts and maize planted as soon as rains begin from March onwards, near houses and in more distant fields; plots also interspersed in the miscellany round houses. Planting continues till early June in Yambio Sub-District and end June or just into July in Tambura Sub-District. Later planting results in virus disease. Harvest August to November, the first-lifted nuts being followed by eleusine and some of the later-lifted by cucurbits.

Balanda: Generally similar but planting starts later owing to later onset of rains and none harvested in time to be followed by eleusine, even if soil conditions in this area would permit double-cropping. *Mangirima* not yet spread into this area to any extent.

Storage

In shell, in baskets in store. Not much attacked by insects.

Utilisation

Seeds for food. Some oil extracted for external application; very rarely used for cooking.

Treatment

(*a*) *Newly lifted*: Shelled and boiled whole, eaten alone.

(*b*) *Fresh or dry*: Shelled, roasted and eaten alone.

(c) *Paste*: Shelled, roasted, inner skins removed, ground (up to 4 times) to smooth oily paste. Chillies may be ground with them and sometimes salt. Eaten with starchy foods, or mixed with some other cooked food e.g. mashed cowpeas, *kavungumba*, solanum leaves. Or diluted with water to form a sauce for vegetables or meat or fish.

SESAME (38)

General

Secondary oilseed among Zande, principal one among Balanda.

Varieties

Several. No consumer preferences expressed.

Cultivation

Zande: In small plots or intersown in eleusine, proportions of the two varying greatly. In Yambio Sub-District often sown in patches in third or fourth year before abandoning a field. Planted June to August, harvest October to December. Heads stacked, head upwards, on vertical racks to dry. Small amounts required for immediate use shelled by hand; larger amounts for storage shelled by holding bunch in one hand over mat or big basket and beating with stick. Threshing completed by January.

Balanda: Some in big fields (up to several acres), some in the mixed cultivation round homesteads. Planted May-June, harvest September-October. None sown with eleusine.

Storage

As seed, in calabash or baskets in grainstore. Keeps well.

Utilisation

For food, and as a vehicle for a number of medicines. Makes sauce of choice for meat and fish. Oil extracted for external application, rarely used for cooking except in sophisticated homes.

Treatment

(a) *For Food*: Steeped in water a few minutes, lightly pounded to loosen out coat; thoroughly dried in potsherd over fire, stirring constantly; husks sieved or winnowed out; seeds returned to fire for further roasting, then ground to paste for use as any other paste.

(b) *For Oil*: Steeped and pounded as above, sun dried and winnowed, ground without preliminary roasting, and boiled to bring oil to surface. Or the paste may be put in a wooden dish, a very little boiling water poured over and then kneaded by hand to express the oil.

CUCURBIT SEEDS

See cucurbits under Leafy Vegetables.

HYPTIS (25)

General

A minor oilseed, chiefly among the Balanda. Less popular with Zande, but a large proportion grow a little of it. Very low-yielding, with aromatic seeds. Eaten sporadically through the year.

Varieties

Distinct black and white varieties.

Cultivation

Broadcast with eleusine. Harvested with eleusine, any heads not ready then being left uncollected.

Utilisation

Roasted and ground to paste for making sauce.

OIL-BEARING TREES

Oil palm (35), Shea nut (34), Meni oil (39), other trees (37 and 39(*a*)).

General

All play a very minor part in the diet, particularly the last two.

Oil palm

Bearing in Government stations, where oil is prepared and used for institutional feeding. Trees growing in missions and here and there among the people. Oil not found in use by peasants in any area visited, but much liked where given in institutions and its use may reasonably be hoped to spread in the course of time as trees mature. Used in meat stews and with green leaves or cooked fresh cassava dipped into hot red palm oil. Reported to be also liked added to groundnut sauce.

Shea nut

Tree found mostly in northern areas. Fruits collected April. Fruits eaten. Oil extracted from nuts by roasting till black, grinding to paste, and boiling to bring oil to surface. Oil used for cooking meat, fish or any vegetable. Also applied externally by Balanda, but not popular among Zande on account of its smell. Supplies small and soon exhausted.

Meni Oil

Found in northern areas and more rarely elsewhere. Fruits collected February. Oil extracted as shea nut, and uses similar, but supplies said to be much smaller. Better liked than shea nut because no smell.

Nzungu (37)

Oil extracted from seeds and used for food or externally. Extraction as above. (Leaves when very young cooked as a herb with meat or mixed with mashed cowpeas.)

African breadfruit (See Appendix I, item No. 39*a*).

Seeds roasted, cracked, and kernel ground to a paste for sauce. May also be eaten without grinding. March-April.

ANIMAL PRODUCTS

MEAT

General

A highly prized subsidiary food. Most is obtained by hunting, therefore supplies are usually dried. Northernmost areas, where population sparsest, get most. Despite restrictions on use of nets during dry season, this still remains the recognised hunting season and meat consumption rises then. Cattle brought in on the hoof by traders for killing off before they die of " fly," and small dairy herds maintained with some difficulty in Government and Mission stations.

Salted meat dried in strips in a neighbouring district being introduced at cotton markets and in institutional feeding.

"Meat" includes a variety of creatures such as tortoise, snake (cobra, python and at least two others), crocodile, frog, large snail, crab, bushrat (a delicacy to some Europeans as well as Azande), fieldmice, and in fact anything which can be caught and cooked.

Utilisation

Cut in pieces, boiled with or without vegetables and potash, sauce-materials (occasionally oil) and seasoning added, and all boiled again. Sesame and groundnuts are the sauce of choice with meat.

Hunting

Traps, nets, spears, arrows, a very few firearms.

BIRDS

General

Very little eaten. Chickens only occasionally killed, usually for a guest or in connexion with poison oracle (*benge*) which does not render them unfit for food. Taboo to some women, and to many (? most) during pregnancy and lactation; women seldom get any anyway, because not enough to go round for them after the husband and his guest(s) have been fed. Many families have no chickens, few have more than two or three apart from young ones, among whom the survival rate is very low. Chicken population fluctuates, with epidemics and generally harsh conditions.

Guinea fowl very occasionally recorded. Small birds constantly hunted by boys with catapults, occasionally with success, and snared with various forms of springes.

Utilisation

Treated like meat.

EGGS

General

Very rarely eaten, too scarce, needed for hatching. Addled eggs eaten after rest of clutch hatched out. Some (? many) women fear them, but real strength of this taboo impossible to judge when opportunities for eating them are so rare, and it may well be really more a manifestation of the usual dislike of the unfamiliar. Considered by some to be a good food for young children.

Utilisation

Hard boiled, shelled and cooked whole with usual sauces (preferably sesame) for eating with porridge.

FISH

General

A minor food of varying popularity, available in dry season when streams low and pools can be dammed. Many families relish it, but sufficient are unaccustomed to it (whether by choice or lack of easy opportunity for fishing) to cause protest at first over its introduction in communal feeding.

Fishing

By women chiefly. Zande mostly with small nets, occasionally aided by poisons; Balanda almost exclusively by poison, collecting the

dead or stupefied fish by hand or in baskets. Both tribes fish by da ming up shallow pools during dry season, making expeditions of seve days at a time to their more distant fishing places and drying the cat to bring home. Family rights are recognised over the bigger poo Fish caught are small. A little dried fish, including bigger kinds fish, comes in from other districts.

Utilisation

Cooked like meat. Dried fish may be pounded to a powder firs Sesame again the sauce of choice.

MILK

Available only in small quantities in Government and Missio stations, where a few senior wage-earners purchase a little.

TERMITES

General

The most highly prized delicacy known to the Zande. Whe the white ants are swarming, their capture takes precedence over al but the most essential occupations. Individual rights over ant-hill are recognised, at least in the case of *akiodo* and *abio*, and disputes aris over priority of claims. General name, *agè*.

Varieties

Four main divisions (themselves sub-divided), of which the fourth is of small account :—

1. *Akiodo* (*Macrotermes natalensis* Hav.), from which alone oil is extracted. Swarms at night after the first rainstorms, *i.e.* February-March for most of the district, but later in the northernmost area, where none had yet flown by late March. One main swarming from each hill. Large.
2. *Abio* (*Macrotermes bellicosus* Smeath.) swarms at night in May-June, intermittently. Large.
3. *Asuwa* swarms in mid-afternoon in September-October, intermittently, but in alternate years only. None flew in Sudanese Zandeland in 1947, though they were reported to be flying on the other side of the divide in French territory. Small.
4. *Ali* flies in late afternoon in September-October, in small driblets. Of minor importance, many people do not bother about them. Small.

Other kinds recorded are :—

5. *Abamilikondo* (*Termes destructor* Smeath.): Small swarms about 3 p.m. in first rains. Eaten on the spot, mostly by children.
6. *Amatindi* (*Microtermes thoracalis* Sjost.) : Small swarms about 8 a.m. in early rains. Eaten as 5.

Methods of Capture

(*a*) Night-flying ants, by means of grass flares to whose light they are attracted, the ground round the hill having been previously cleaned and holes dug into which the ants are swept as they fall to the ground. Bright moonlight interferes with the proceedings because many of the ants fly up towards the light and are dispersed.

(c) Day-flying varieties, by covering the exit-holes with specially designed baskets or some improvised covering.

(d) When signs are observed indicating the death of the queen in an *akiodo* hill, the whole hill may be excavated to get out the ants for food. Not done with *abio*, which build much harder hills and live deeper below the surface.

Storage

Roasted and sun-dried (except *akiodo*, for which the roasting is omitted), the wings being winnowed out. Stored in calabashes in the grainstore. Supplies are usually exhausted within a few weeks of the end of the swarming season. Oil is stored in gourds, bottles, etc., and sparingly used. Some was seen which had been hoarded right round to the next season, but this is exceptional. In general, supply is small and soon exhausted.

Utilisation

For food, either eaten alone with salt without further cooking, or made into a paste or sauce. Oil used as any other cooking oil, and for external application for which it is the oil of choice.

Treatment

(a) *Extraction of oil*: Sun-dried ants are heated with a little water, put into some form of bag and pressed by hand on a small platform of sticks so arranged that the liquid is collected in a pot. Details of arrangements vary, heavy stones sometimes being used. The mixed oil and water is then boiled to remove the water. The residual ants are sun-dried and stored for eating. Oil extracted—about 25% by weight of the original sun-dried ants.

(b) *Paste*: Dried ants pounded, salt added. Oil may be added, either ant oil or meni oil (39) irrespective of whether the ants used for the paste have had their oil extracted or not.

(c) *Sauce*: Dried ants ground (twice) to smooth black paste, stirred into water, seasoned, boiled for a few minutes. The water may be the liquid in which green leaves are already cooking, particularly Jew's mallow (53). They may also be ground raw, perhaps with leaves of sweet potato or rosella to "make them sour," and then lumps of the paste may be boiled with salt or potash or both.

INSECTS (except Termites)

General

Very minor foods sporadically eaten, with considerable local differences. One kind of caterpillar has quite a marked season in some places in November, and another in January. With sophistication contempt and disgust for these foods develops, and many peasant families are now shy of admitting their consumption, saying, "Only our old people eat them." In their season, caterpillars were to be seen frying in many homes and in January bundles were observed going to market.

Varieties

(*a*) *Caterpillars*: At least five kinds, known by the trees they feed on. Could not be identified without adult forms. Zande names :—
abakiwe, akpatakunya, akpoyo, anangiriga, andiri.

(*b*) *Grasshoppers*: Short-horned (*Acanthacris ruficornis*, Sjost.) and long-horned (*Homorocoryphus* sp.). Former described as having no special season, and as "hard like locusts" and not oily. Latter "very oily," season November, "better than locusts." Zande names :—*bakirigba* and *nzede*.

(*c*) *Locusts* when they come.

(*d*) *Crickets* (*Brachytypes membranaceus*, Dru.): Best season, June-July. Taboo to children for fear "they will not be able to hear for the singing in their ears." Zande name, *kperende*.

(*e*) *Ants*: (i) *Abandakulanzeme* (*Carebara colossus* Gerst.). Said to be caught a few at a time about midday in March. "Very oily." (ii) *Anzike*. Tree ants. Red. Said to be little eaten now except by old people.

Utilisation

(*a*) *Caterpillars*: Hair singed off by roasting in potsherd. Sun-dried and used for stew with usual sauces.

(*b*), (*c*), (*d*) *Grasshoppers, locusts, crickets*: Roasted and eaten with salt.

(*e*) *Tree ants*: Ground and mixed with hyptis for a sauce. Or salted, tied up in a leaf and cooked in hot embers. Others roasted and eaten.

VEGETABLES

LEAFY VEGETABLES (40-67*c*)

General

Out of 29 leafy vegetables listed, only the following are of importance :—

Amaranths (48); Various. Includes A. patulus Bertol. and A. caudatus L.
Jew's mallow (53): Several varieties.
Solanum (60): Several varieties.
Pumpkin (43, 44):
Cassava (46): Of sweet or bitter varieties.
Sweet potato (41):
Rosella (56): Balanda chiefly.
Deccan hemp (58): Balanda only.

Preferences

Preferences expressed varied, ranging among the following :—

Zande	*Balanda*
Jew's mallow (53)	Rosella (56)
Solanum (60)	Deccan hemp (58)
Amaranths (48)	
Pumpkin leaves (43, 44)	

(Okras were everywhere generally liked by most people above all leafy vegetables.) Occasionally a favourable comment on cassava leaves was received, but usually these and sweet potato leaves were only tolerated. Zande regarded Deccan hemp as inedible. Balanda

praised it highly. Zande liked rosella only with fish (some said also meat). Balanda rated it highest among leafy vegetables. Cocoyam leaves (17) not eaten because of burning sensation caused in mouth by their minute crystals. This can usually be overcome by discarding cooking-water, but attempts to do so with colocasia growing in Yabu station were unsuccessful.

Cultivation

Amaranths, Jew's mallow, solanum and rosella are cultivated in the sense that seed is scattered round the homesteads. Apart from that, they fend for themselves with only rare instances of more deliberate cultivation. Deccan hemp was found planted in patches among the other crops by the Balanda. For pumpkins, cassava, sweet potatoes and okras see under appropriate headings. Other leafy vegetables are found as occasional plants round the houses (45, 49, 50, 62, 65, 67 (*b*)), others wild. Except for cassava and sweet potato leaves, which are available all or a large part of the year, the leafy vegetables come on between April and December in a series of flushes.

Storage

A few people dry small amounts in November. Solanum (60) and Jew's mallow (53) were seen; some informants said amaranths are also so treated, but others denied it. Rosella (tender shoots, calyx and young fruits) dried by Balanda, and sometimes by Zande. Dried leaves stored in any suitable container in house or grainstore.

Utilisation

For food, usually in small quantities as part of the side-dish accompanying porridge. Sometimes eaten in greater quantity as a main dish, by women. Nursing mothers eat them to improve their milk supply.

Seldom eaten without a sauce made of ground oil-seeds or sometimes okras (75). Potash used to break down fibres and shorten cooking-time. Specially necessary with cassava, sweet potato, Jew's mallow (53) and fibrous wild leaves; less so with amaranths (48) and solanum (60) and not at all with pumpkin leaves.

Several kinds may be combined in one dish and leaves may be added to meat or fish stew, except amaranths and pumpkin leaves which are kept for dishes in which leafy vegetables are the main feature. Leaves which go slimy like Jew's mallow (53) are liked for the consistency they give to the dish.

Treatment

(*a*) *Side-dish.* Put into boiling water, potash added if required, cooked fast or slowly (uncovered) till soft, sauce materials and or seasoning stirred in, all boiled for several minutes. Covered and set aside till wanted, which may be anything from a few minutes to several hours. Eaten hot tepid or cold; may be re-heated if quite cold. No water discarded unless amount has been misjudged, when a little may be removed before adding sauce materials.

(*b*) *For eating alone.* As above, but less water, to give a drier mixture which can be handled without the help of a lump of porridge.

(*c*) *Cassava leaves.* Meal is pounded to remove toxic element. Then treated as above. Occasionally mixed with sesame or

groundnut paste, wrapped in leaves and boiled; in particular, for taking on a journey. A fungus (*akpangi*) may be included in this dish.

(*d*) *Solanum leaves* (60): In addition to ordinary uses, may be mixed with groundnut paste, wrapped in leaves, and boiled; particularly for taking on a journey or as a gift to a neighbour.

(*e*) *Drying*: Stalks and coarse leaves removed, leaves roughly cut up, spread in sun to dry. No blanching.

CUCURBITS (27, 28, 29, 30, 31, 32, 33, 36)

Pumpkins, gourds, calabashes, inedible melons, cucumbers.

General

Minor foods, in various food categories—fruits as vegetables, seeds as oilseeds, leaves. Hard shells also serve as domestic utensils. Widely grown in small quantities.

Varieties

(*a*) *Pumpkins*: Main divisions—*boko* (plain leaf, plain-coloured fruit of various shapes, orange-yellow to off-white, soft skin), and *besende* (flecked leaves, flecked fruit of various shapes, green and white or smooth-skinned and yellow, hard skin). *Besende* very much preferred. Both kinds sub-divided, and valued according to differences in flavour and texture.

(*b*) *Inedible fruits*: Lagenaria, citrullus, luffa, bitter cucumber. Grown for their seeds. Lagenaria (*kpagu*) is highly prized, found chiefly in Yambio Sub-District, none seen north of Tambura. Citrullus (*datiro*) also less common northwards though some seen in all areas. Some elderly Balanda claim for it, as for bulrush millet, a much greater importance in the past until, with the appearance of certain weed grasses, it began to fail. Luffa (*bangombe*) seen in all areas except extreme north. Seemed to be commonest round Tambura, though so little grown that a sample was difficult to get. Bitter cucumbers also grown in very small quantities. Distinguished from edible kind by plain colour.

(*c*) *Bottle gourds, calabashes*: Grown everywhere in varying amounts, primarily for domestic purposes and only incidentally as food.

(*d*) *Cucumbers*: edible, striped green and yellow, grown in small amounts in all areas.

Cultivation

(*a*) *Pumpkins*: Planted early rains, fruiting latter half of rains. Length of season varies with local conditions of soil and water, being shortest in the extreme north where sowing is impossible before April and plants have dried up by end October. Under more favourable conditions, season extends to end November.

(*b*) *Inedible fruits*: Conflicting information. In southern areas, early plots of lagenaria (*kpagu*) said by some to be planted with maize, and citrullus (*datiro*) in July, but practically none seen in Tambura Sub-District until the late planting. In both sub-districts these crops and bitter cucumbers are planted in small plots on land from which groundnuts are harvested in

September and October. Harvest according to planting. Late-planted lagenaria appeared in Yambio market in January, while late citrullus was not ready for sale, *i.e.* cleaned, till March. Luffa planted in early rains to climb over trees in eleusine fields, ripens December.

(c) *Bottle gourds, Calabashes*: Planted early rains to ripen end of October onwards.

Storage

Seeds stored in bottle-gourds or calabashes, in grainstore. Store well. Fruits and leaves eaten fresh only.

Utilisation

For food in various forms, and domestic utensils.

Treatment

(a) *Pumpkins*: Boiled in segments with skin on, or whole, and eaten alone. Or may be mashed after cooking and sesame or groundnut paste stirred in: this also eaten alone. Young fruits and flowers included in vegetable stews.

(b) *Seeds*: Kernels of seeds of all the cucurbits, not only those specially grown for their seeds, are eaten. Shelled, roasted, ground and used like other pastes. Seeds of boiled pumpkins may be broken open and the kernel eaten.

(c) *Bottle gourds and Calabashes*: Whole fruit of bottle gourds may be boiled and eaten when very young and tender. Balanda also sometimes eat them mature when not too bitter. For domestic utensils, when fruit is ripe and shell has hardened, hole is cut in it and it is immersed in water until pulp has rotted. Shell then cleaned, and seeds stored for food.

(d) *Edible Cucumber*: Eaten raw.

(e) *Leaves*: Of pumpkin and bottle gourd, the latter chiefly by Balanda. See under Leafy Vegetables. Pumpkin leaves extremely popular.

OKRA (78)

General

The most widely and regularly eaten of all vegetables. Prized for giving the sauce a good consistency, but some people dislike its sliminess.

Varieties

Several. *Bazeringe* liked for being specially slimy, *mboyo baramu* for its quick growth.

Cultivation

Sown among other crops round houses and in fields throughout planting season, with a few dry-season plants where conditions permit. First supplies eagerly awaited to replace dwindling dried stocks. Harvested serially according to planting.

Storage

Sliced and sun-dried for use throughout dry season. Stored in any suitable container in house or grainstore.

Utilisation

Fruits and leaves eaten, the latter rarely.

Treatment

(*a*) *Fruit*: Fresh-cut in pieces and cooked in any of the usua side-dishes to eat with porridge. Dried-pounded or ground t powder and used as a sauce ingredient.

(*b*) *Leaves*: As other leafy vegetables, q.v.

FUNGI (126)

General

A minor food of the rainy season, eaten as and when they happen to be found.

Varieties

All varieties liked, but particularly *akisi, degbe* and *ngede.*

Storage

Sometimes sun-dried, especially *ngede* which will keep for some little time.

Utilisation

As stew ingredients.

Treatment

As any vegetable. *Akpangi* used specially with cassava leaves and sesame, see under Leafy Vegetables.

OTHER Vegetables (68, 69, 77, 78)

Bagbodi (tree), spring onions, rosella, tomatoes

General

Young fruits of *bagbodi* very occasionally used in side-dishes. Spring onions and tomatoes rarely grown, and then in small amounts for occasional use. Young fruits of rosella, fresh or dried, used with leafy vegetables, q.v.

Treatment

Cooked along with other stew ingredients.

JUICY FRUITS AND STEMS

FRUITS (79-125)

General

A long list, but none save mangoes eaten in any large quantity. A long way second, come bananas (see under Starchy Roots and Fruits), then pineapples. Other cultivated fruits (guavas, citrus, pawpaws, mulberry, Cape gooseberry) practically non-existent except in or near Government and Mission stations, except limes which are found sporadically, especially at bush-shops which make a lime and honey drink for travellers. Very little use made of wild fruits, which can often be seen left untouched close by the homesteads. No systematic collection, barring occasional expeditions by children. Many are very acid, some give only a fibrous pulp to be chewed and spat out, *e.g.* borassus palm.

Mangoes universally eaten in large quantities from March to June. Starting and finishing dates vary noticeably in different localities.

Utilisation

Eaten as they are, except limes, whose juice is squeezed and mixed with either honey or chillies. Sophisticated homes may use sugar with it, and the most sophisticated will occasionally squeeze lime juice on to a "salad" of raw onions and other recently introduced vegetables.

STEMS (128-130)

General

Stems of sweet sorghum, cut green, and (in Yambio area) sugar-cane are chewed for their juices. Stem of a wild fig (130) said to yield a refreshing juice.

MISCELLANEOUS

STEW INGREDIENTS (131-133)

General

Rarely used.

Anzeri: a riverine tree whose fruits yield a kernel which may either be eaten as it is, or ground to a paste for sauce when ordinary ingredients are scarce.

Gbaddangi: a creeper whose crushed stem yields a slimy liquid; used with groundnut paste to make a sauce. Juice may also be drunk alone.

Kpoyo: a green stick may be pounded and cooked in a termite sauce to which it gives a slimy consistency.

Borassus palm roots: young root bark may be used as a stew ingredient in dry season.

FLAVOURINGS (134, 135)

Chillies: Widely used as a condiment all year round, fruits being dried and used as a powder for the short season during early rains when not available fresh. Growing wild, or volunteer plants in homesteads. (One of principal exports of district.) Ground with sauce materials or, in sophisticated homes, served separately as a powder.

Mint: Very rare. Used as flavouring for sauce.

HONEY

Collected for export market and occasionally mixed in pap, rice, or "bread" of maize or cassava flour. Makes an unfermented drink with lime juice and a fermented one (*duma*) with a starter of bulrush millet.

SUGAR

Not seen outside more or less sophisticated homes.

BEVERAGES

Tea and *Coffee*: only in homes of a few wage-earners.

Honey: See above.

Beer: Universal; see special section of report.

Cooking-water of sweet potatoes and cowpeas is often drunk.

MINERALS

POTASH—Native "Salt" (136-162)

General

Made from ashes of plants listed in Appendix I.

Method of Production

Water allowed to filter slowly through ashes. In small-scale production for immediate use, this liquid added to cooking water of stews. In large-scale production, ashes put into conical filter with water seeping through into pot below. Liquid then concentrated by

boiling, and resulting "salt" set aside as a lump or ball, in a broken pot. Covered with ashes and left four to five days to dry out. Sets in two fractions :—

(*a*) Soft inner part, powdery, not much savour, sells at approx. 6 m/m. per 100 g.

(*b*) Outer shell, hard, crystalline, good sharp flavour, sells at approx. 10 m/m. per 100 g.

About 2 kg. may be made at a time.

Utilisation

In cooking, used in quantities similar to ordinary salt, to soften food and cook it quickly. Particularly with the more fibrous leafy vegetables, hyptis and okras ; also termites.

SOME ZANDE MEDICINES (163-213*b*)

INTERNAL USE

Bagara (168) : For pneumonia.

Bangiribakiki (174) : Infusion of roots taken for gonorrhoea.

Bangirimvuru (175) : Infusion taken for pain in chest. See also external use.

Bangiringama (176) : Antidote for snake-bite.

Bingba (180) : Infusion taken for pain in chest.

Dakadia (181) : Infusion of leaves taken for stomach-ache

Dama (182) : Infusion of roots taken for gonorrhoea. See also external use.

Gbangagbe (184) : Antidote for snake-bite.

Gengere (188) : Infusion of roots taken for sore throat. Also for gonorrhoea.

Gorokurungba (189) : Antidote for snake-bite.

Humugbe (190) : Cough medicine.

Ngurunza (200) : For pneumonia.

Nzere (202) : Cough medicine.

Parabaso (203) : For dysentery. Also antidote for poisoning said to be caused by administering "hair of the ant-eater" in someone's beer. Effect of poison said to be swelling of the throat ending in suffocation.

Ranga ziga (204) : Three kinds ; informants vague on purposes for which used.

Ranga ngurumba (204) : Given to sick children "when bodies go pale." Roots cooked with sesame for child to eat. Also applied externally.

Ranga Bakiti (204) : Infusion of leaves used as an emetic in cases of poisoning. Root also eaten cooked in sesame, as antidote to poison.

Rindiseke (206) : For gonorrhoea.

Tukuri (208) : Infusion of pounded roots in hot water taken for stomach-ache.

Udipia (209) : Infusion of roots taken for gonorrhoea.

Ziga (211) : Cooked with sesame and taken as antidote for poison.

EXTERNAL USE

Abagambo (163) : Leaves pounded and applied to fresh wound.

Aduruko (164) : Leaves and stems ground and mixed in warm water for application for scabies, headache, fever.

Agunda (165), *Makpama* (193) : Two very similar aromatic herbs. Crushed in water for smelling to relieve headache, or for external application for headache or fever.

Anongbo (166) : Leaves pounded and applied to skin diseases.

Azuangi (167) : Root used for eye inflammations.

Bakaikpa (169) : Applied to wounds and syphilitic lesions.

Bakatura (170) : Fruit juice dropped into wounds or applied to scabies.

Bakaya (171) : Applied to leprous patches.

Bambiri (173) : Applied to scabies.

Bangirimuru (175) : Applied to leprous patches.

Batari (177) : Crushed for smelling to relieve headache ; " it makes you sneeze." Also for fever.

Bavutire (178) : Applied to abscess, to draw it.

Bazirisangu (179) : Bark crushed and applied to wounds.

Dama (182) : Dried fruit pounded, heated in sun and applied to relieve headache. See also internal use.

Gasiambara (183) : For toothache.

Gbarakuri (185) : For toothache.

Gbugari (186) : Applied to chickenpox and scabies.

Gbunga (187) : Castor oil, applied to scabies.

Kubokubo (191) : Pounded leaves, or ashes, applied to sores. Leaves prepared in some way not clear for cupping (by means of a horn) to relieve headache.

Kuma (192) : For toothache. (Note that its other use is for stupefying bees.)

Mangayu (194) : Pounded leaves inserted in ear as counter-irritant in ear-ache. Said to cause blistering if left in too long.

Mataria (195) : Ashes mixed with an oil and applied to head for killing lice.

Mbazia (196) : Aromatic. Pounded leaves used for sponging down a person with high fever.

Mvuwere (197) : Citronella. Pounded with water and applied to relieve headache.

Ngbiringbiri (199) : Applied to tinea.

Nzemekingoro (201) : Roots pounded in water and rubbed on to relieve headache.

Ranga, unspecified (204) : Leaves pounded with water and applied to swellings on limbs " got from working in the long grass."

Rangburangba (205) : Sausage-tree. Ashes of fruit applied to wounds.

Tomedari (207) : Juice put in eye when filaria worm passes through it.

Wakayu (210) : For scabies.

Zambara (211) : Ashes applied to scabies.

Gero (213*a*) : For scabies.

Kitika (213*b*) : For reducing inflamed swellings.

NO DATA ON MANNER OF USE

Ngbage (198) : Unspecified " medicine for children." Probably should have been in list of magic plants.

POISONS

Arrow Poisous (214-216)

Bakatura and *giango* : juice.

Riga : Ashes mixed in oil and applied.

Fish Poisons (217-223)

General

Used for stupefying fish by scattering on surface of dammed-up pools ; smaller fish are killed by them.

Particular

Baranga, kundubaderi. Both act quickly. Pounded roots used raw.

Gbururi, Makoko, Mirizigba, Nzengere : All require several hours to take effect. *Gbururi*—roots pounded and boiled. *Makoko*—pounded leaves ; some say, also bark. *Mirizigba*—raw pounded root. *Nzengere*—ripe pods coarsely pounded and boiled.

Other Poisons (224-225)

Kuma : root-bark burnt to produce a smoke which stupefies bees.

Seribasi : infusion of pounded roots poured into holes of ant-hills.

Perfumes (226-229)

Appropriate part of plant dried, ground and mixed in oi for use. by women. *Aduruko*—fruits. *Akuki, agbagi*—roots. *Mbazia*l—leaves

Personal Wear (251-254)

Bagadi. Inner bark beaten out into large sheets, used for loincloths, shorts, wrapping babies, etc. Unfortunately cannot be washed.

Bangiribakike : Seeds for beads.

Kato : Cotton spun by hand, rolling on thigh. Hand-woven into tiny pieces of cloth.

Pupuki : Grass skirts for girls.

Miscellaneous Domestic Purposes (260-268)

Bagara : Leaves for mattresses. Wood makes fire-sticks for kindling.

Bakaya : Leaves used like sandpaper for smoothing wooden handles.

Dakpa : Leaves used in serving food.

Inga : Calabashes.

Kpakpa : Leaves used for washing face.

Nagbanga : Bottle gourds.

Ngbege : Handles of implements.

Sabuna pia : Roots make water " soapy " for washing clothes.

Vura : Kapok, For stuffing pillows (sophisticated homes only).

Bakiwe : Spearshafts.

Birikito : Stools and wooden bowls.

Kpoyo : Arrow-shafts.

Nganzidupo : Pipe-stems.

Nge : Charcoal.

Magic (171-286)

Hunting magic : 272, 274, 278, 282, 283.

Crop magic : 280, 286.

Oracles : 275, 276, 281.

Protection against witchcraft or other harmful influence : 279, 284 (*fukofuko* and two other kinds).

" *Medicines* " : 271, 273, 277, 285.

APPENDIX III

TWO MORE SOPHISTICATED METHODS OF PREPARING MAIZE FLOUR

Method 1

After thorough drying, the grain is removed from the cob—time about three hours per 10 kg. of grain. Water should be heated to about 40°C., but this refinement is often omitted; the grain is put to soak overnight. It is then pounded and rubbed through a sieve; time 6.75 hours per 10 kg. original grain. The unsieved residue is ground, taking about one hour. Both fractions are thoroughly dried in the sun for a couple of days, this requiring the constant presence of someone in the homestead, though hardly ranking as work. The final weights recorded were :—

Pounded fraction :	47% of original grain
Ground fraction :	22% of original grain
Loss :	31% of original grain

The 47% is fine flour for use for food; the 22% dried out into small lumps for grinding for white beer. The working time is nearly 12 hours to 10 kg. original grain.

Method 2 (for *kisra*)

Dry maize is put into a mortar with a little water and pounded, the water preventing it from jumping about too much; time, 1 hour per 10 kg. grain. After a few minutes in the sun a fraction amounting to 20% of its wet weight is winnowed off; time 45 minutes. It is then left in water overnight, by which time the grain has swollen up, and is ready for grinding and sieving, a process which takes 6.25 woman-hours, including pauses and chatting. 22% by weight (weight taken after soaking) is lost, the coarse waste being thrown to the chickens. Cold water (25°C. on the occasion recorded) is stirred in, and after one hour the dough is ground again; time 1.25 hours with only such waste as is unavoidable after careful scraping of the stone. The result is a batter of the consistency of thick cream. This is allowed to stand for a day to sour slightly. Next day about 1.5 litres of water are brought to the boil, a lump of dough about the size of a hen's egg is mixed with cold water and stirred briskly into the boiling water by twirling a wooden whisk. After a minute or two, the liquid is poured onto the main mass of dough and left to stand without stirring for a few moments before being thoroughly mixed in. Sufficient cold water is then added to give a pouring batter, ready for use. A supply for two to three days may be made at once.

As near as could be gauged, the flour from which the batter is made is about 60% of the original grain, while x cc. of the pouring batter represents x/2 g. of the refined flour. Its preparation requires roughly 9.5 woman-hours per 10 kg. of original grain. The women not unnaturally dislike *kisra* for the amount of work involved, unless they can obtain flour ready ground, and it is usually only the master of the house and his friends who get it, the women and children sticking to the old-fashioned porridge.

APPENDIX IV

ANALYTICAL VALUES USED IN EVALUATING DIETARY DATA

Analytical values used in the dietary calculations have been selected after careful consideration of such factors as treatment, maturity, and any other circumstances bearing on the condition of the food, in order to arrive, as nearly as possible, at an estimate of actual intake. Wherever appropriate data are available on Sudan foodstuffs, these have of course been used. For the rest, values have been taken mainly from Tables of Representative Values (xvi) with a few from other sources as listed below and with any necessary adjustments for moisture content and other factors. The carbohydrate values are "by difference," items from (xvi) being adjusted accordingly. Calorie values have been calculated throughout by the factors 4 : 9 : 4.

Intakes reported here should not be compared *directly* with findings arrived at by some other technique of evaluation, *e.g.* entirely on a raw-food basis. Nor should these values be applied to other dietaries without due consideration of differences in circumstances and practices which will affect the condition of the food.

TABLE 27

Sources

(i), (ii), (iii), (v), (vi), (ix), (x), (xiii), (xiv), (xvi), (xx), (xxi), (xxii) and information supplied by Miss M. W. Grant, Nutrition Department, London School of Hygiene and Tropical Medicine.

TABLE 1

METEOROLOGICAL DATA FOR YAMBIO DISTRICT

MONTH	TEMPERATURE (Cent.)				REL. HUM. %		RAINFALL (mm.)	
	Maximum		Minimum					
	Yambio	Yubu	Yambio	Yubu	Yambio	Yubu	Yambio	Yubu
ıary	35.6	32.9	18.9	18.5	76	57	16.0	7.2
uary	35.0	33.2	19.6	19.6	78	65	29.2	20.7
h	35.2	32.6	19.9	19.8	80	71	93.4	61.5
l	32.1	30.8	20.2	19.5	87	82	147.5	103.2
.....	30.4	30.0	19.1	19.2	92	86	177.0	213.7
.....	29.4	28.6	19.1	18.6	95	87	165.0	210.8
.....	28.6	27.6	18.7	18.5	97	88	200.5	161.1
ıst	28.5	28.0	18.7	18.5	98	89	161.0	201.0
mber	29.8	29.0	18.7	18.6	95	86	169.4	215.3
ber	no record	29.8	no record	18.7	no record	85	173.3	162.1
mber.....	30.6	31.2	18.6	19.0	91	76	76.5	53.5
mber	32.4	32.3	16.7	18.5	95	66	20.3	14.0
, average al	(31.6)	30.5	(18.9)	18.9	(89)	78	1,429.1	1,424.1

Yambio : Rainfall 1921-1946 : other figures, 1946 only.
Meteorological Dept. consider relative humidity figures doubtful
Yubu : All figures, 1928-1946.

TABLE 2

RAINFALL IN YUBU DURING SURVEY PERIOD

MONTH	mm.
July 1947	339.5
August	192.4
September	201.9
October	78.4
November.	53.9
December	'5 6
January 1948	3.0
February	3.0
March	70.5
April	78.2
May	121.0
June	101.5
Total ..	1,248.3

TABLE 3

COMPOSITION OF POPULATION

GROUP	TOTAL	PERCENTAGE			
		Men	Women	Children	Uncla
(*a*)					
Yambio Sub-District					
Zande	56,910	42	36	22	
(*b*)					
Tambura Sub-District					
Zande	28,008	30	39	28	
Balanda (Bakiri)	11,686	28	34	36	
" (Bo Road & Sue)	7,726	24	29	43	

(*a*) Sleeping sickness inspection figures 1947.
(*b*) " " " " 1948.

TABLE 4

HISTORIES OBTAINED FROM WOMEN

AGE GROUP	No.	CHILDREN PER WOMAN		PERCEN OF CHIL SURVIVI
		Live Births	Surviving (*a*)	
Past childbearing				
Zande	67	5.6	3.9	70
Balanda	17	5.0	4.1	82
Childbearing period, 2nd half (*b*)				
Zande	94	2.2	1.5	68
Balanda	39	4.6	3.6	78
Childbearing period, 1st half (*c*)				
Zande	87	0.9	0.7	78
Balanda	40	1.7	1.2	70

(*a*) Still living, or died after reaching adult life.
(*b*) Judged to be over 30 years.
(*c*) Judged to be under 30 years; any married less than 2 years were exclud

TABLE 3

FREQUENCY OF OCCURRENCE OF VARIOUS CROPS
(as percentage of agricultural units)

CROP (Number refers to Plant List, Appendix I)	ZANDE NAME	PEASANT GROUPS							WAGE-EARNERS	REMARKS
		ZANDE				BALANDA			YUBU Station	
		Ukua	Momboi	Madi	Taba	Mupoi	Bakiri	Bo Road		
		22 units	24 units	33 units	47 units	21 units	275 units	27 units	47 units	
Cereals:										
Eleusine (3)	moru	100	100	96	87	(57)	(41)	96	66	
Maize (4)	ngbava	100	100	81	100	52	70	52	91	
Sorghum (8)	vunde	91	70	48	57	52	76	100	49	
Sweet Sorghum (1)	koko	82	84	27	42	57	48	59	70	
Bulrush millet (5)	ngiria	—	—	3	2	N.R.	(1)	15	2	
Rice (2)	mapunga	9	38	12	4	—	—	—	4	
Starchy Roots & Fruits:										
Cassava (15)	tara, gbanda	100	100	100	100	100	89	100	100	
Sweet potatoes (9)	abangbe	100	100	96	100	81	58	96	96	
Cult. yams (16)	gbara	45	50	39	57	29	33	45	30	
Wild, yams (13, 16, 18*a*)		27	54	21	13	(9)	(9)	19	13	
Aerial yams (18)	mere	50	67	21	40	15	16	11	17	
Cocoyams (17)	manzi	41	21	36	30	15	4	4	28	
Bananas (14)	bu	95	100	84	66	43	17	15	55	
Legumes:										
Cowpeas (21)	abapu, ayarze	77	92	45	42	(5)	(31)	85	23	
Mung beans (19)	abakpa	64	58	33	38	(5)	(20)	30	—	
Earthnuts (22)	abaundu	86	79	45	51	(29)	(24)	30	13	
Lima beans (24)	akpokoworo		21	—	—	(5)	N.R.	11	—	
Climbing cowpeas (20)	abangua	—	—	12	—	N.R.	(1)	31	—	
Pigeon pea (23)	adugo	5	—	—	2	—	—	15	—	

N.R. = No record

[ ] = Not for food

( ) = Incomplete

TABLE 5 (*Contd.*)

FREQUENCY OF OCCURRENCE OF VARIOUS CROPS

(as percentage of agricultural units)

CROP (Number refers to Plant List, Appendix I)	ZANDE NAME	PEASANT GROUPS							WAGE-EARNERS	REMARKS
		ZANDE					BALANDA			
		Ukua	Momboi	Madi	Taba	Mupoi	Bakiri	Bo Road	YUBU Station	
		22 units	24 units	33 units	47 units	21 units	275 units	27 units	47 units	
Oilseeds:										
Groundnuts (26) ...	awande	100	100	87	98	(67)	(62)	89	68	
Sesame (38)	sere	77	84	39	45	(43)	(58)	81	21	
Hyptis (25).....	andeko	41	79	63	66	(19)	(30)	93	15	
Citrullus (30)	datiro	(36)	(46)	63	26	(5)	(4)	26	N.R.	
Lagenaria (33)	kpagu	(68)	(25)	(6)	30	(15)	(3)	—	N.R.	
Luffa (27)	bangombe	55	84	45	68	(5)	(3)	—	4	
Oil palm (35)	mbiro	9	21	9	6	—	1	—	13	
Leafy Vegetables:										
Amaranths (48) ...	kpedekpede, mbadabu	Widespread, both in and out of gardens, during the rainy season								
Jew's mallow (53) .	morombida									
Solanum (60).....	nzuo	100	96	63	70	48	51	55	91	
Rosella (56)	namba	91	79	24	53	(43)	(30)	93	61	
Deccan hemp (58) .	nzibi	[45]	[42]	—	[23]	(15)	(16)	81	—	
Miscellaneous		19	16	3	12	5	9	4	2	
Cucurbits (except as under Oilseeds) :										
Pumpkin (70, 71) ..	boko, besende	95	100	100	93	80	78	96		
Cucumber (73)	koforo, mbuguru .	36	42	15	9	15	2	15		
Bottle gourd (76)...	nagbanga	59	50	27	30	43	27	37		Not primarily for

FREQUENCY OF OCCURRENCE OF VARIOUS CROPS

(as percentage of agricultural units)

CROP (Number refers to Plant List, Appendix I)	ZANDE NAME	PEASANT GROUPS							WAGE-EARNERS	REMARKS
		ZANDE					BALANDA			
		Ukua	Momboi	Madi	Taba	Mupoi	Bakiri	Bo Road	YUBU Station	
		22 units	24 units	33 units	47 units	21 units	275 units	27 units	47 units	
Other Vegetables:										
Okra (75)	mboyo	100	96	78	98	76	60	85	N.R.	
Tomato (78)	tamatim	5	—	18	17	—	9	—	"	
Eggplant	bedingani	5	—	3	—	—	—	—	"	
Spring Onions (69)	basala	18	29	27	9	—	3	—	"	
Chillies (134)	riaria	81	67	57	98	(43)	(32)	89	"	
Juicy Fruits:										
Mango (107)	manga	73	75	57	57	(19)	(25)	52	"	
Citrus		5	—	6	6	—	5	4	"	
Pineapple (83)	ananas	23	4	45	32	5	3	—	"	
Pawpaw (117)	papai	—	—	18	36	5	4	—	"	
Other		—	—	—	13	—	1	4	"	
Some Useful Plants:										
Tobacco (269)	gbakaro	[81]	[96]	[69]	[63]	[52]	[48]	[81]	"	
Tephrosia (221)	makoko	—	—	[3]	—	N.R.	N.R.	[48]	"	Fish poison.
Cotton	kato	[100]	[100]	—	—	—	—	—		In new settlements
Wild Cotton (253)	kato	—	—	[15]	[13]	[33]	[16]	[48]	N.R.	
Asteracanthus ? (152)	mukpo	23	58	36	40	29	15	7	"	For "salt"

TABLE 6

FOOD CROP AREAS FOR 1947
(in acres)

GROUP	DESCRIPTION	CROP AREA CULTIVATED 1947				MATU CASSA (in aband fields)
		Active Adults		Whole Group		
		No.	Per Adult	No.	Per Head	Per Active Adult
Ukua (*a*)	2nd-year settlement.	47.5	0.93(*b*)	71	0.60(*b*)	In old h no
Momboi (*a*)	1st-year settlement	72	0.73(*c*)	107	0.49(*c*)	In old h no
Taba	Not resettled	90	0.63(*d*)	134	0.42(*d*)	0.13
Bo Road	Not resettled	43	1.39(*e*)	96	0.60(*e*)	0.13

(*a*) Figures refer to food crops only and exclude the cotton plots.
(*b*) Acreage of land 0.72 and 0.48 per active adult and per head respectively, of whic was double-cropped.
(*c*) Acreage of land 0.68 and 0.46 respectively, of which 7.5% was double-croppe
(*d*) Acreage of land 0.60 and 0.40 respectively, of which 5% was double-croppe
(*e*) No double-cropping.

TABLE 7

AREAS OF VARIOUS CROPS WHERE MEASURABLE, 1947(*a*)
(in acres)

CROP	GROUP (*b*)	ACREAGE		ADDITIONAL PLANTI (in other crops)
		Per Active Adult	Per Head	
Eleusine	Ukua ..	0.60	0.40	
	Momboi.	0.58	0.39	
	Taba ...	0.33	0.22	+
	Bo Road	0.47	0.21	+
Maize.....	Ukua ..	No record(*c*)		++
	Momboi.	No record(*c*)		++
	Taba ...	0.14(*d*)	0.09(*d*)	++
	Bo Road	No record(*e*)		
Sorghum ...	Ukua ..	0	0	+
	Momboi.	0	0	+
	Taba ...	†	†	+
	Bo Road	0.26	0.12	+
Rice	Ukua ..	†	†	
	Momboi.	†	†	
	Taba ...	†	†	
	Bo Road	0	0	

TABLE 7 (*Contd.*)

AREAS OF VARIOUS CROPS WHERE MEASURABLE, 1947 (*a*)
(in acres)

CROP	GROUP (*b*)	ACREAGE		ADDITIONAL PLANTING (in other crops)
		Per Active Adult	Per Head	
Cassava ...	Impossible to estimate : planted in varying densities among most other crops			
Sweet potatoes	Ukua	†	†	++
	Momboi...	†	†	+
	Taba	0.02	0.01	++
	Bo Road .	0.04	0.02	+
Pulses (cowpeas, mung beans earthnuts)....	Ukua	0.02	0.01	+
	Momboi...	0.02	0.01	+
	Taba	0.01	†	+
	Bo Road .	0.05	0.02	+
Groundnuts ..	Ukua	0.18	0.12	
	Momboi...	0.08	0.05	
	Taba	0.18	0.13	
	Bo Road .	0.13	0.06	
Sesame	Ukua	0.08	0.05	+
	Momboi...	0.03	0.02	+
	Taba	0.01	†	++
	Bo Road .	0.38	0.17	

† = Some measurable plots, but average under 0.01.

(*a*) Most plots interplanted in varying degrees, therefore acreages are overlapping figures.
(*b*) Descriptions as in Table 6.
(*c*) All grew main July crop and then planted scattered maize through eleusine.
(*d*) Figures refer to July crop plus a few small pure-stand later plots.
(*e*) A small July crop ; no second planting through eleusine.

TABLE 8

ESTIMATED PRODUCTION OF CERTAIN FOODSTUFFS (*a*)

FOODSTUFF	PER HEAD PER ANNUM		PER HEAD PER DAY	
	Lbs.	Kgs.	Calories	Protein, g.
	Ukua (*b*)			
Eleusine, grain.....	200	91	814	11.0
Maize, grain	(121) (*c*)	(55) (*c*)	(554)	(15.7)
Sorghum, grain	8	4	36	1.2
Sweet potatoes, gross ...	60	27	65	1.0
Pulses, shelled	4	2	17	1.1
Groundnuts in shell	120	54	626	25.8
Sesame, seed	15	7	109	5.5
Total	524	240	2,221	61.3

TABLE 8 (*Contd.*)

ESTIMATED PRODUCTION OF CERTAIN FOODSTUFFS (*a*)

FOODSTUFF	PER HEAD PER ANNUM		PER HEAD PER DAY	
	Lbs.	Kgs.	Calories	Protein, g.
Mom boi				
Eleusine	195	89	795	10.8
Maize	(121) (*c*)	(55) (*c*)	(554)	(15.7)
Sorghum	8	4	36	1.2
Rice, hulled	2	1	7	0.2
Sweet potatoes	30	14	32	0.5
Pulses	4	2	17	1.1
Groundnuts	50	23	262	10.8
Sesame	6	3	46	2.3
Total	446	204	1,751	42.6
Ta ba				
Eleusine	110	50	451	6.1
Maize	121	55	554	15.7
Sorghum	4	2	18	0.6
Sweet potatoes	120	54	129	2.0
Pulses	2	1	7	0.4
Groundnuts	130	59	716	28.4
Sesame	4	2	29	1.5
Total	491	223	1,904	54.7
Bo R oad				
Eleusine	90	41	365	4.9
Maize	(40) (*d*)	(18) (*d*)	(184)	(5.2)
Sorghum	96	44	427	15.5
Sweet potatoes	90	41	97	1.5
Pulses	8	4	34	2.2
Groundnuts (*e*)	48	22	252	10.4
Sesame	34	15	242	12.5
Total	436	199	1,601	52.2

(*a*) Reasonable expectation from the acreages in Table 7. No allowance made for the bad harvest of 1947.

(*b*) Groups as described in Table 6.

(*c*) Taken as Taba.

(*d*) Taken as Taba x 1/3.

(*e*) Incompatible with other evidence which shows sesame to be much more important than groundnuts in the Bo Road.

TABLE 9

OCCUPATIONS (*a*)
(other than routine domestic tasks)

GROUP	MONTH	HOUSE-DAYS RECORDED	PERCENTAGE OF DAYS ON WHICH FAMILY CLAIMED TO GIVE TIME TO:	
			Agriculture	Special Tasks(*b*)
Zande				
Taba	July	1,078	43	11
	August	468	71	1
	September	1,014	24	3
	October	675	15	6
	November.....	857	42	25
	December	743	27 (*c*)	18
	January	707	4	10
	February	857	7	55
	March	978	12	53
	April	725	38	6
	May	799	37	1
	June	751	56	10
Madi	October	854	43	15
Momboi.....	October	801	24	48
Ukua	November.....	765	61 (*d*)	7
Momboi.....	March	584	39	21
Ukua	March	660	30	10
Balanda				
Bo Road	Sept./Oct.	605	38	25
Bo Road	Feb./Mar.	926	†	42

† = under 1%

(*a*) Incomplete because on a proportion of days on which families were not seen they were absent working (*e.g.* distant fields, fishing); but this gives an idea of the shape of the year's work curve.
(*b*) Building, fishing, hunting, various crafts.
(*c*) An abnormal year with failure of the late harvest.
(*d*) 1-2 hours gentle cotton-picking made up a large proportion of these days.

TABLE 10

PRINCIPAL LEAFY VEGETABLES RECORDED AT TABA EACH MONTH

VEGETABLES (*a*)	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MARCH	APRIL	MAY	JUNE
Amaranths (48)					xxx	xx					xxxx	xx
Jew's mallow (53) ...	xxxxx	xxx								x	xxx	xxxx
Solanum (60)		x	xxx	xxxx	xxxx	x						
Pumpkin leaves (43, 44)	xxxxx	xxx										
Cassava leaves (46) ..		x	xxxx	xxx	xxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	x
Sweet potato leaves (41)							xxxx	xxx	xxx	xxxxx	x	
Number of entries ...	951	743	406	366	451	182	144	112	103	202	495	548

x = Eaten on 20% or more of the house-days on which leafy vegetables were recorded in a week.

(*a*) Number in brackets refers to plant list, Appendix I.

TABLE 11

ANALYSIS (a) OF ZANDE "SALT" (POTASH)

SAMPLE	CHEMICAL		PERCENTAGE	
(outer fraction)	CaO		Nil	of
	SO_4	Calc. as Na_2SO_4	2.1	dry
	Cl	Calc. as NaCl.	73.2	matter
	pH (10% aq. Soln.)		8.8	
	Moisture		0.35	
	Carbonate		Present appreciably.	
(inner fraction)	CaO		0.20	of
	SO_4	Calc. as Na_2SO_4	22.8	dry
	Cl	Calc. as NaCl.	53.4	matter
	pH (10% aq. Soln.)		9.2	
	Moisture		0.41	
	Earthy matter		0.50	
	Carbonate		Present appreciably.	

(a) Reference (xxi)

TABLE 12

FREQUENCY OF MEALS

OUP	MONTH	HOUSE-DAYS	RECORD OF FULL MEALS (as percentage of total days).			
			3 & over	2	1	0 (a)
t						
.....	July	1111	†	7	83	10
	August	1126	0	7	80	13
	September ..	1256	0	11	73	16
	October	1158	†	9	74	16
	November...	1003	†	10	67	22
	December ..	983	4	15	60	21
	January	775	†	8	76	16
	February ...	779	3	23	45	29
	March	927	5	15	39	42
	April	741	1	10	60	29
	May	816	†	12	61	26
Zande Groups	June	994	†	11	75	14
.....	October	764	1	15	57	28
oi.....	October	692	†	13	71	15
.....	November...	717	†	14	63	22
oi.....	March	675	†	15	71	14
.....	March	699	1	25	63	10
a						
oad	Sept./Oct. ..	580	0	4	68	28
oad	Feb./Mar. ..	893	2	18	59	21
Earners						
e	January	551	†	23	65	12

† = under 1%

Not, of course, synonymous with no food.

TABLE 13

ZANDE PEASANT GROUPS (*a*)

FREQUENCY OF USE OF VARIOUS FOODS AT DIFFERENT SEASONS

(as percentage of house-days)

MONTH	SEPT.	OCT.		NOV.	DEC.	MAR.	
Group	Mupoi	Madi	Momboi	Ukua	Ibba	Momboi	Uk
DESCRIPTION	Not re-settled (*b*)	Not re-settled	1st-year settle-ment	2nd-year settle-ment	2nd-year settle-ment	as before	a bef
Recording period.....	3 days	1 month	1 month	1 month	1 day	1 month	1 mo
House-days	46	831	775	758	77	626	68
Cereals:							
Eleusine	87	31	58	66	58	40	5
Maize.....	28	14	17	3	—	—	—
Sorghum	2	2	19	—	3	†	—
Starchy Roots & Fruits							
Cassava	83	78	78	33	70	72	9
Sweet potatoes	4	26	16	38	53	15	3
Yams.....	4	2	11	2	4	21	1
Bananas	4	4	†	2	—	1	
Pulses:							
Peas and Beans	2	16	46	4	13	2	
Oilseeds:							
Groundnuts	78	84	82	75	54	58	6
Sesame	24	†	2	2	42	10	
Other.....	—	1	†	11	1	†	
Oils:							
Various	0	†	—	—	—	†	
Animal Products:							
Meat and birds	20	4	—	2	10	15	2
Fish	9	†	†	4	3	11	2
Insects	—	—	—	23(*c*)	—	24(*d*)	3
Vegetables:							
Leafy.....	59	51	74	28	40	30	1
Okras	30	39	57	59	27	37	6
Cucurbits	20	8	12	2	—	—	—
Juicy Fruits & Stems:							
Mangoes	—	—	—	—	—	10	—
Stems	—	5	8	2	—	—	—

† = under 1%.

(*a*) Except Taba, for which see Fig. c.
(*b*) Includes 4 families receiving wages from the Mission.
(*c*) Caterpillars.
(*d*) Termites.

Occasional Use. Other fruits & vegetables, Rice, Bulrush millet, Cocoyams, Eggs, Fungi, Coffee (Ibba only).
Constant Use. Salt, Potash, Chillies.

TABLE 14

BALANDA PEASANT GROUPS

FREQUENCY OF USE OF VARIOUS FOODS AT DIFFERENT SEASONS
(as percentage of house-days)

MONTH	AUG.	SEPT./OCT.	FEB./MAR.
GROUP	BAKIRI	BO ROAD	BO ROAD
CRIPTION	NOT	RESETTLED	
ording period	3 days	1 month	1 month
se-days	38	579	797
eals:			
eusine	21	1	43
aize	18	1	—
rghum	—	†	23
chy Roots & Fruits:			
ssava	100	78	83
veet potatoes	—	10	13
ms	—	4	†
nanas	—	—	—
es:			
as and beans	—	14	3
eeds:			
oundnuts	29	17	10
same	52	74	60
her (*a*)	21	†	15
:			
rious	3	†	5
mal Products:			
eat and birds	16	2	15
sh	—	†	3
ects	—	—	—
etables:			
afy	71	51	39
kras	29	31	13
curbits	13	21	—
y Fruits & Stems:			
ango	—	—	7
ems	—	23	—
cellaneous:			
alt	—	—	2

† = under 1%.

(*a*) Almost entirely hyptis.

Occasional Use Wild fruits, Bulrush millet, Eggs (excluding python eggs)
Constant Use Salt, Potash, Chillies (greatly reduced in Feb./March)

TABLE 15

WAGE - EARNERS

FREQUENCY OF USE OF VARIOUS FOODS AT DIFFERENT SEASONS
(as percentage of house-days)

MONTH	JULY		SEPT.	OCT.	JANUARY			A
GROUP	TEA-CHERS	YUBU	YUBU	TEA-CHERS	YUBU	POLICE	CLERKS	Y
DESCRIPTION	C.M.S. Mission, self-recorded	Hospital staff, self-recorded	Hospital & Station Staff	As before	As Sept.	Yambio	Yambio self-recorded	S
Recording period	1 week	1 week	3 days	1 week	3 days	2 weeks	1 week	3
House-days	70	252	144	28	64	541	40	1
Starchy Roots & Fruits:								
Cassava	90	86	95	92	97	85	60	
Sweet potatoes	6	4	9	47	—	36	35	
Yams.....	1	—	3	2	—	†	—	
Bananas	9	1	—	—	—	12	30	
Pulses:								
Peas and beans	5	—	3	7	2	†	8	
Oilseeds:								
Groundnuts ..	56	64	87	85	86	70	70	
Sesame	24	40	11	—	16	12	18	
Other.....	13(*a*)	4	1	21(*a*)	—	9	10	
Oils:								
Various	24	9	3	—	—	2	15	
Animal Products:								
Meat & birds	58	19	3	63	31	24	40	
Fish	7	4	†	—	27	12	25	
Insects (*b*) ...	19	6	—	—	—	—	—	
Eggs	6	1	—	—	—	†	2	
Milk	—	5	—	—	—	6	15	
Vegetables:								
Leafy.....	67	72	75	42	8	4	18	
Okras	21	18	50	14	66	56	52	
Cucurbits	16	12	3	—	—	—	—	
Onions.....	19	†	†	—	—	11	30	
Tomatoes	14	—	5	—	—	—	—	
Juicy Fruits & Stems:								
Mangoes	11	—	—	—	—	—	—	
Other fruits ..	4	†	1	—	†	1	17	
Stems	9	†	3	—	—	†	—	
Miscellaneous:								
Honey	11	1	—	32	—	—	—	
Tea	49	7	3	25	9	6	34	

† = under 1%.

(*a*) All cucurbit seeds.
(*b*) Termites.

Occasional Use. Other vegetables, Sardines, Fungi, Sugar, Co
Constant Use. Salt, Potash, Chillies.

TABLE 16

TABA: BREWING RECORDED JULY 1947 — JUNE 1948 (15.000 litres)

KIND OF BEER	%	PURPOSE	%
eusine/maize/cassava	38	Sale	71
eusine/maize	23	Mourning feasts	15
eusine/cassava	11	Distilling	5
eusine	10	Private	5
ize/cassava	10	Cultivation	4
ize/sorghum	2		
ssava/sorghum	2		
eusine/sorghum	1		
eusine/maize/sorghum	1		
rious (maize, maize/bulrush millet, cassava/ bulrush millet, sorghum bulrush millet) ..	2		

TABLE 17

BREWING RECORDED IN PERIODS OF ONE MONTH IN VARIOUS ZANDE PEASANT GROUPS

ROUP	MONTH	LITRES	KIND OF BEER	%	PURPOSE	%
di	October	1,500	Maize/eleusine/cassava	91	Chief's feast	42
			Maize/eleusine	7	Sale	36
			Maize/cassava	2	Private	22
mboi ..	October	150	No record		No record	
ua ...	November	1,600	Mixed, predom. red ..	100	Sale	54
					Mourning feasts ...	20
					Private	14
					Building parties ...	12
mboi ..	March ..	650	Mixed, white	75	Sale	78
			Eleusine	15	Private	22
			Mixed, red	10		
ua ...	March ..	1,650	Mixed, predom. red for drinking and white for distilling	100	Distilling (for sale) .	60
					Sale	32
					Private	8

TABLE 18

ZANDE PEASANT GROUPS
FOOD CONSUMPTION PER HEAD PER DAY (g., RAW EDIBLE PORTION)

MONTH	Aug.	Oct.		Nov.		Feb.	Mar.		May	REMARKS
SAMPLE	Taba	Madi	Mom-boi	Taba	Ukua	Taba	Mom-boi	Ukua	Taba	
DESCRIPTION OF GROUP	Modified peasant not resettled	Not resettled	1st-year settlement	As before	2nd-year settlement	As before	As before	As before	As before	(Principal item in italics)
HOMES	47	33	29	42	25	40	25	(23)	37	
PERSON/DAYS ..	389.5	322	277	352	245	309	221	(220)	360	
Cereals:										
Eleusine	69	48	101	29	257	79	133	(166)	60	
Other.....	70	35	49	24	5	19	—	—	11	*Maize*, sorghum, rice
Starchy Roots & Fruits:										
Cassava, dry	352	254	257	381	227	277	215	(196)	316	Normally bitt
Cassava, fresh ...	74	95	45	20	13	72	30	(9)	19	Sweet only.
Sweet potatoes ..	15	182	31	276	308	270	143	(218)	—	Mostly white
Other.....	4	6	17	73	2	36	196	(28)	5	Yams, banan
Pulses:										
Peas & beans ...	1	21	52	42	32	4	—	—	4	Given as dry.
Oilseeds:										
Groundnuts	48	69	61	101	105	74	41	(50)	49	Given as dry.
Other.....	22	†	†	6	21	11	21	(16)	2	*Sesame*, hypti cucurbit seed
Oils:										
Sesame, shea, termite.	†	—	—	†	—	3	9	(1)	2	
Animal Products:										
Meat & birds fresh	—	2	—	5	—	1	—	—	3	
Meat dried	2	†	—	4	—	10	7	(50)	3	
Fish dried	†	—	†	†	4	15	13	(28)	†	
Insects dried	†	—	—	—	17	—	40	(63)	6	*Termites*, caterpillars.
Vegetables:										
Leafy, fresh	67	43	39	25	20	9	6	(12)	68	Various
Okras, fresh	26	7	23	35	23	—	—	—	3	
Okras, dried	†	†	—	—	†	6	4	(11)	†	
Other including fungi (*c*)	122*d*	52	50	26	2	1	†	(†)	†	See (*a*).
Juicy Fruits:										
Mangoes	—	—	—	—	—	—	—	—	259	
Other including stems	5	5	1	†	—	1	—	—	4	See (*b*).
Miscellaneous:										
Honey	—	—	—	—	—	—	—	—	†	

† = under 1g.

Ukua in March very dubious, owing to lact of supervision and the disturbing effects of local distilling operations.

(*a*) Pumpkin, rosella, tomatoes, spring onions, chillies, pumpkin flowers.
(*b*) Pineapple, citrus, pawpaw, wild fruits, sorghum stems.
(*c*) Fungi never more than †.
(*d*) Pumpkin 119.

TABLE 19

BALANDA PEASANT GROUP (BO ROAD)

OOD CONSUMPTION PER HEAD PER DAY g., RAW EDIBLE PORTION

MONTH	Sept./Oct.	Feb./Mar.	REMARKS
DESCRIPTION OF GROUP	Not resettled		
MES	25	29	
RSON/DAYS	288	310	
eals:			
leusine	5	86	
orghum	2	78	Unrefined flour.
rchy Roots & Fruits:			
assava, dry	282	116	Normally bitter.
assava, fresh	57	232	Sweet only.
weet potatoes, fresh	26	44	White.
ams	23	1	
ses:			
owpeas, fresh and dry		3	Given as dry.
seeds:			
roundnuts, fresh & dry	1	4	Given as dry.
esame	68	56	
lyptis..	1	8	
s:			
hea, Meni	†	3	
lmal Products:			
leat, dried	—	18	
ish, fresh & dried	—		
getables:			
eafy, fresh	50	40	
kras, fresh	15	—	
kras, dried	—	2	
ther	181(*a*)	†	Pumpkin, rosella, bottle-gourd, chillies, pumpkin flowers.
cy Fruits:			
langoes	—	6	
ther, including stems	13	—	Sorghum stems.

† = under 1 g.

(*a*) Pumpkin 171. No fungi recorded here at all.

TABLE 20

WAGE — EARNERS

FOOD CONSUMPTION PER HEAD PER DAY (g., RAW EDIBLE PORTION)

MONTH	SEPT.		JAN.		APR.	REMARKS
SAMPLE	Yubu	Police	Yubu	Survey	Yubu	
DESCRIPTION OF GROUP	Hospital & Station Staff	Yambio Police Lines	As before	Nutrition Clerks & Recorders. No Families	As before	(Principal items in italics)
HOMES	47	39	32	—	48	
PERSON/DAYS	583.5	248	388	40	647	
Cereals:						
Eleusine	11	110	42	—	30	
Other	10	37	2	—	2	*Maize*, sorghum, rice.
Starchy Roots & Fruits:						
Cassava, dry	398	337	363	430	303	Normally bitter.
Cassava, fresh	76	38	27	12	24	Sweet only.
Sweet potatoes, fresh ..	23	142	229	125	3	Mostly white.
Other	14	58	2	—	—	*Yams*, bananas fres & dry (given as fresh
Pulses:						
Peas & beans, fresh & dry	3	—	—	—	—	Given as dry.
Oilseeds:						
Groundnuts, fresh & dry .	72	86	81	64	72	Given as dry.
Other	9	19		—	5	*Sesame*, cucurbit seed
Oils:						
Sesame, shea, meni ..	†	4	†	—	1	
Red palm	†	—	—	—	—	
Animal Products:						
Meat & birds, fresh ..	2	14	3	10	10	
Meat, dried	†	10	7	5	19	
Fish, dried	†	4	13	16	18	
Eggs	†	—	†	2	†	
Milk, fresh	—	4	—	—	1	
Insects, dried	—	—	†	—	4	*Termites*, caterpillar
Vegetables:						
Leafy, fresh	47	3	3	12	17	Various.
Leafy, dried	—	†	†	—	—	Solanum.
Okras, fresh	20	2	8	23	†	
Okras, dried	—	14	12	12	7	
Other, including fungi ..	18	5	†	†	†	See (*a*).
Juicy Fruits:						
Mangoes	—	—	—	—	421	
Other, including stems ..	2	11	1	—	—	See (*b*).
Miscellaneous:						
Tea	—	†	—	†	—	
Sugar	—	†	—	†	—	

† = under 1g.

(*a*) Pumpkin, rosella, tomatoes, eggplant, onions (large & spring), chillies, pumpkin flowers.
(*b*) Pawpaw, sorghum stems, sugar cane.

TABLE 21

ZANDE PEASANT GROUPS

NUTRIENT INTAKE PER HEAD PER DAY

MONTH	AUGUST	OCTOBER		NOVEMBER		FEB.	MARCH		MAY
SAMPLE	TABA	MADI	MOMBOI	TABA	UKUA	TABA	MOMBOI	UKUA(*a*)	TABA
DESCRIPTION	Modified peasant not resettled	Not resettled	1st-year settlement	As before	2nd-year settlement	As before	As before	As before	As before
HOMES	**47**	**33**	**29**	**42**	**25**	**40**	**25**	**(23)**	**37**
PERSON-DAYS	389.5	322	277	352	245	309	221	(220)	360
Calories	2,275	2,050	2,075	2,775	3,050	2,400	2,450	(2,575)	1,925
Protein, g.	41	40	43	60	71	56	52	(79)	33
Fat, g.	**39**	**38**	**32**	**57**	**67**	**49**	**66**	**(78)**	**31**
Carbohydrate, g.	437	417	398	507	539	447	404	(394)	380
Ca, g.	**1.0**	**0.7**	**0.8**	**0.8**	**1.6**	**1.2**	**1.3**	**(1.7)**	**0.7**
Fe, mg.	21	16	20	21	28	21	34	(47)	18
Vitamin A, I.U. (*b*) ..	7,200	6,700	4,800	5,700	3,800	3,700	1,300	(4,100)	9,000
Aneurin (vitamin B_1) mg.	1.2	1.3	1.5	1.8	2.3	1.4	1.1	(1.4)	0.9
Riboflavin, mg. ..	0.5	0.5	0.5	0.6	0.6	0.5	0.5	(0.6)	0.5
Nicotinic acid, mg. ..	19	19	18	27	27	22	14	(19)	14
Ascorbic acid (vitamin C), mg.	20	28	12	29	21	31	15	(20)	95
Ascorbic acid, raw value, mg.	109	117	79	101	93	94	51	(71)	164
Protein Carbohydrate, % ..	9.4	9.6	10.8	11.9	13.2	12.6	12.9	(20.2)	8.7

(*a*) Very dubious, owing to lack of supervision and the disturbing effect of local distilling operations.
(*b*) As carotene.

TABLE 22
BALANDA PEASANT GROUPS
NUTRIENT INTAKE PER HEAD PER DAY

MONTH	SEPT.-OCT.	FEB.-MA
DESCRIPTION OF GROUP	Peasant, not resettled	
HOMES	25	29
PERSON-DAYS	288	310
Calories	1,775	1,975
Protein g.	39	62
Fat, g.	39	42
Carbohydrate g.	313	362
Ca, g.	0.9	1.5
Fe, mg.	22	28
Vitamin A, I.U. (*a*)	6,250	3,600
Aneurin (vitamin B_1), mg.	0.7	1.1
Riboflavin, mg.	0.5	0.8
Nicotinic acid, mg.	10	13
Ascorbic acid (vitamin C), mg.	13	38
Ascorbic acid, raw value, mg.	82	155
Protein/Carbohydrate, %	12.5	17.1

(*a*) As carotene.

TABLE 23
WAGE-EARNERS
NUTRIENT INTAKE PER HEAD PER DAY

MONTH	SEPT.	JAN.			APR
SAMPLE	YUBU	POLICE	YUBU	SURVEY	YUBU
DESCRIPTION	Hospital & Station Staff	Yambio Police Lines	As before	Nutrition clerk & Recorders. No Families	As befor
HOMES	47	39	32	—	48
PERSON-DAYS	583.5	248	388	40	647
Calories	2,125	2,775	2,375	2,175	2,075
Protein, g.	35	55	50	45	55
Fat, g.	41	58	46	35	45
Carbohydrate, g.	403	502	437	425	338
Ca, g.	0.7	1.1	1.0	0.9	1.
Fe, mg.	15	24	18	16	19
Vitamin A, I.U. (*a*)	4,900	1,300	2,200	2,450	5,700
Aneurin (vitamin B_1), mg.	0.9	1.5	1.2	0.8	1.
Riboflavin, mg.	0.4	0.5	0.5	0.4	0.
Nicotinic acid, mg.	18	24	21	17	19
Ascorbic acid (vitamin C), mg.	19	22	17	11	138
Ascorbic acid, raw value, mg.	93	55	61	51	157
Protein/Carbohydrate, %	8.7	11.0	11.5	10.6	16.

(*a*) As carotene.

TABLE 24

PERCENTAGE WEIGHT CHANGES PER 4 MONTHS

	n	MEN	WOMEN	BOYS	GIRLS
NDE:					
ate rainy season (Aug.-Dec.)	27	+ 4			
	43		+ 3		
	86			+ 13	
	11				+ 8
ry season (Dec.-Apr.) ..	50	— 2			
	82		— 1		
	166			+ 1	
	57				+ 4
LANDA:					
arly part of dry season ..	16	+ 1			
	24		+ 2		
	15			+ 5	
	20				+ 6

TABLE 25

AGE OF FIRST MENSTRUATION
(Pupils at Mission Schools)

GROUP	SOUTH (YAMBIO)		NORTH (MUPOI & YUBU)	
	Age known	Age (*a*) estimated	Age known	Age (*a*) estimated
of first Menstruation:				
12 years	—	2	—	—
13 years	1	5	1	—
14 years	6	10	7	2
15 years	—	1	4	2
16 years	—	—	3	5
17 years	—	—	1	—
18 years	—	—	1	—
yet begun:				
14 years	no data	no data	11	7
15 years	no data	no data	6	2

(*a*) By headmistress.

TABLE 26

CALORIE AND PROTEIN REQUIREMENTS AND INTAKE
(per head per day)

GROUP	TABA				MOMBOI		UKUA ROAD		BO ROAD	
OCCASION (*a*)	1	2	3	4	1	2	1	2	1	2
(*b*) **Composition**										
Men	45.5	37.3	32.3	31.8	24.5	22.7	20.0	20.0	19.3	22.7
Women (*c*) ...	55.5	54.1	45.7	56.3	38.2	30.7	41.7	38.7	31.7	34.0
Adolescents ..	8.5	6.3	9.5	7.4	4.0	3.0	3.0	2.7	12.0	15.0
Children 7-12 years	10.3	8.3	8.5	11.0	6.0	2.0	7.0	5.0	19.5	18.0
Children 2-6 years	6.0	7.8	4.0	9.0	16.7	12.7	9.0	6.0	9.0	8.0
Babies under 2 years	4.0	3.3	3.0	4.5	3.0	2.7	1.0	1.0	4.5	5.7
	129.8	117.1	103.0	120.0	92.4	73.8	81.7	73.4	96.0	103.4
AVERAGE WEIGHT, Kg.	46	49	49	46	41	43	49	49	38	40
Calorie requirements:										
A. 2,500 for av. weight 60 kgs. (xvii) and *pro rata*	1900	2000	2000	1900	(*d*) 1700	(*d*) 1800	2000	2000	1600	1700
B. Based on actual body-size, activities etc. (xv)	2300	2200	2200	2400	(*d*) 2150	(*d*) 2200	2150	2300	2100	2100
CALORIE INTAKE	2275	2775	2400	1925	2075	2450	3050	(2575)	1775	1975
Protein requirements, g.										
A. 1 g./kg. on av. body-weight (xvii) .	46	49	49	46	(*d*) 41	(*d*) 43	49	49	38	40
B. Based on N.R.C. rates for weight and age (xii)	53	57	57	56	(*d*) 51	(*d*) 51	56	56	51	51
Protein intake, g.	41	60	56	33	43	52	71	(79)	39	62

(*a*) For periods at which quantitative recording was done, see Tables 18-23.
(*b*) People present for all or part of the 3-day recording period in each home; hence the fractions.
(*c*) Pregnant and lactating women included and allowed for.
(*d*) Group was probably temporarily below its normal weight, therefore requirement should be rather higher.

VALUES USED IN EVALUATING ZANDE DIETARY DATA
(per 100g. edible portion)

FOOD	Water	Calories	Protein	Fat	Carbo-hydrate	Ca	Fe	Vit. A	Aneurin	Ribo-flavin	Nic. Acid	Asc. Acid as eaten
	g.		g.	g.	g.	mg.	mg.	I.U.	mg.	mg.	mg.	mg.
Cereals:												
1. Eleusine grain (*a*) ...	7	361	4.9	1.0	83	392	5.3	†	0.28	0.04	1.3	0
2. Maize, fresh	50	210	5.9	2.9	40	7	2.8	†	0.38	0.13	4.3	5
3. Maize, dry grain	12	367	10.4	5.0	70	12	5.0	†	0.33	0.13	1.5	0
4. Maize, refined flour..	12	354	8.3	0.5	79	9	2.0	†	0.05	0 03	0.6	0
5. Sorghum, grain (*b*) ...	11	357	12.9	2.4	71	18	6.7	†	0.47	0.10	3.0	0
6. Sorghum, refined flour	11	360	12.7	2.4	72	17	8.8	†	0.44	0.08	2.6	0
7. Rice, home-pounded	12	352	9.9	2.3	73	10	2.0	†	0.24	0.10	2.0	0
Starchy Roots & Fruits:												
8. Cassava, bitter, dried (after soaking). Var. *gbazamangi* (*c*)	8	355	1.7	0.5	86	93	2.3	0	†	0	0.8	0
9. Cassava, bitter, dried (after soaking). Var. *karangba* (*d*)	8	355	2.7	0.5	85	100	2.3	0	†	0	0.8	0
10. Cassava, sweet, fresh var. *mandi* (*e*) ...	60	155	0.4	0.2	38	38	1.0	0	†	0.1	0.7	6
11. Cassava, sweet, dried (after soaking)	8	352	0.9	0.5	86	86	2.3	0	†	0	0.8	0
12. Sweet potatoes (*f*) ..	70	129	2.0	1.0	28	20	0.7	white† 0.10 coloured 4,000	0.10	0.06	0.7	6
13. Yams.....	73	108	2.0	†	25	10	1.2	—	0.05	0.06	0.4	†
14. Banana, fresh.....	70	127	1.0	0.3	30	7	0.5	350	0.05	0.06	0.5	10
15. Banana flour	10	380	3.0	0.9	90	21	1.5	1,050	0.15	1.18	0 5	0
Pulses:												
16. Cowpeas, dry	10	329	24.0	1.0	56	90	4.0	†	0.89	0.14	1.3	0
17. Cowpeas, fresh	50	182	13.3	0.5	31	50	2.2	†	0.49	0.08	0.7	3
18. Mung beans, dry ...	11	325	24.0	1.0	55	200	9.0	0	0.42	0.34	2.3	0
19. Earthnuts, dry	10	363	20.8	5.8	57	90	4.0	—	0.30	0.14	1.3	0
20. Earthnuts, fresh	50	202	11 5	3.2	32	50	2 2	—	0 17	0 08	0 7	3

TABLE 27 (*Contd.*)

VALUES USED IN EVALUATING ZANDE DIETARY DATA
(per 100 g. edible portion)

FOOD	Water	Calories	Protein	Fat	Carbohydrate	Ca	Fe	Vit. A	Aneurin	Riboflavin	Nic. Acid	Asc. Acid as eaten
	g.		g.	g.	g.	mg.	mg.	I.U.	mg.	mg.	mg.	mg.
21. Soya beans (Sind No. 10)	11	406	42.5	17.8	19	290	6.7	†	1.07	0.31	2.0	0
Oilseeds:												
22. Groundnuts, dry	6	558	23.0	45.6	14	90	2.0	†	0.90	0.14	17.4	0
23. Groundnuts, new crop dry	20	476	19.6	38.8	12	77	1.7	†	0.77	0.12	14.8	1
24. Groundnuts, freshly-lifted	45	336	13.0	28.0	8	29	1.0	†	0.50	0.08	10.2	3
25. Sesame	4	575	29.0	47.0	9	707	15.2	†	0.42	0.23	5.0	0
26. Hyptis (*g*)	4	434	20.1	29.1	23	214	—	†	0.44	0.16	2.4	0
27. Citrullus (*g*)	3	516	21.8	43.2	10	121	—	†	0.44	0.16	2.4	0
28. Lagenaria (*g*)	2	627	30.7	52.5	8	79	—	†	0.44	0.16	2.4	0
29. Luffa (*g*)	4	500	32.8	37.0	9	12[1]	—	†	0.44	0.16	2.4	0
Oils:												
30. Red palm oil	0	900	0	100	0	0	0	60,000	0	0	0	0
31. Other vegetable oils	0	900	0	100	0	0	0	0	0	0	0	0
32. Termite oil	0	900	0	100	0	0	0	0	0	0	0	0
Animal Products:												
33. Meat, lean, fresh	77	90	17.0	2.4	†	8	2.7	†	0.06	0.17	3.4	†
34. Meat, dried	22	305	57.7	8.2	†	27	9.2	†	0.20	0.46	9.2	0
35. Fish, dried, mixed(*b*)	30	272	50.0	8.0	†	2,000	8.0	†	†	0.26	3.4	0
36. Chickens, fresh	73	139	19.0	7.0	†	15	3.0	†	0.15	0.15	6.0	†
37. Termites (*akioda*), some oil extracted	2	593	24.6	55.0	†	64	39.2	0	—	—	—	0
38. Termites (*akioda*), whole	2	673	18.2	66.7	†	47	29.0	0	—	—	—	0
39. Termites (*abio*), whole	9	551	22.8	51.1	†	59	36.4	0	—	—	—	0
40. Caterpillars, dried	30	291	49.0	10.5	†	70	1.8	—	—	—	—	0
41. Milk, fresh	88	62	3.1	3.5	5	120	0.1	140	0.04	0.15	0.1	†

VALUES USED IN EVALUATING ZANDE DIETARY DATA
(per 100 g. edible portion)

FOOD	Water	Calories	Protein	Fat	Carbony-drate	Ca	Fe	Vit. A	Aneurin	Ribo-flavin	Nic. Acid	Asc. Acid as eaten
	g.		g.	g.	g.	g.	mg.	I.U.	mg.	mg.	mg.	mg.
Leafy Vegetables:												
42. Unspecified, dark green, fresh	85	44	4.0	0.4	6	210	3.0	13,000	0.15	0.25	0.9	10
43. Amaranths, fresh, *kpedekpede*	91	27	2.4	0.2	4	(167)	1.8	7,800	0.09	0.15	0.5	6
mbadabu						(112)						
44. amaranths, dried, *kpedekpede*	12	232	23.5	2.4	29	(1,633)	17.6	42,900	0.29	0.49	1.7	20
mbadabu						(1,095)						
45. Solanum, fresh (*nzuo*)	87	23	2.8	0.4	2	100	2.6	11,300	0.13	0.22	0.7	9
46. Solanum, dried	12	164	18.8	2.8	15	677	17.6	42,900	0.29	0.49	1.7	20
47. Jew's mallow, fresh (*morombida*)	86	18	3.7	0.4	6	196	2.8	12,100	0.14	0.23	0.8	9
48. Jew's mallow, dried	10	238	24.0	2.4	30	1,260	18.0	42,900	0.30	0.50	1.7	20
49. Pumpkin leaves	90	29	3.0	0.3	4	140	2.0	8,700	0.10	0.17	0.6	7
50. Cassava, leaves	74	55	7.5	0.7	5	100	3.0	9,000	0.30	0.43	1.5	60
51. Sweet potato leaves	90	32	2.3	0.3	5	140	2.0	8,700	0.10	0.17	0.6	7
52. Purslane (*sesere*)	93	22	1.6	0.4	3	200	10.0	350	0.07	0.07	0.3	5
Other Vegetables:												
53. Okras, fresh	89	35	1.7	†	7	77	1.1	1,100	0.11	0.11	0.8	2
54. Okras, dried	12	294	13.8	0.7	58	616	8.8	†	0.29	0.26	2.0	6
55. Pumpkins	90	24	1.0	†	5	20	0.8	500	0.04	0.05	0.7	2
56. Tomatoes	92	20	1.0	†	4	9	0.4	1,200	0.05	0.04	0.7	13
57. Onions, dry	87	37	1.0	†	8	30	0.4	250	0.03	0.10	0.1	3
58. Fungi	90	7	1.0	0.3	†	5	1.2	0	0.12	0.34	3.1	2
Juicy Fruits & Stems:												
59. Mangoes	83	59	0.7	†	14	10	0.5	1,000	0.8	0.05	0.2	30
60. Pawpaws	89	38	0.6	†	9	10	0.5	2,500	0.02	0.02	0.1	60
61. Wild fruits	—	—	—	—	—	—	—	—	—	—	—	30
62. Sweet sorghum stem	75	58	0.5	†	14	25	1.0	0	†	—	—	†
63. Sugarcane	82	58	0.4	†	14	10	1.0	0	†	—	—	†

For further notes, see Appendix IV

(*a*) B vitamins may be somewhat reduced in preparing flour.

(*b*) Vitamin figures allow for losses in preparing unrefined flour.

(*c*) Predominant in Yambio Sub-District.

(*d*) Predominant in Tambura Sub-District.

(*e*) Predominant sweet variety in both sub-districts.

(*f*) No allowance made for possible leaching of minerals and B vitamins in cooking. Ascorbic acid taken as 10 if the cooking-water is consumed.

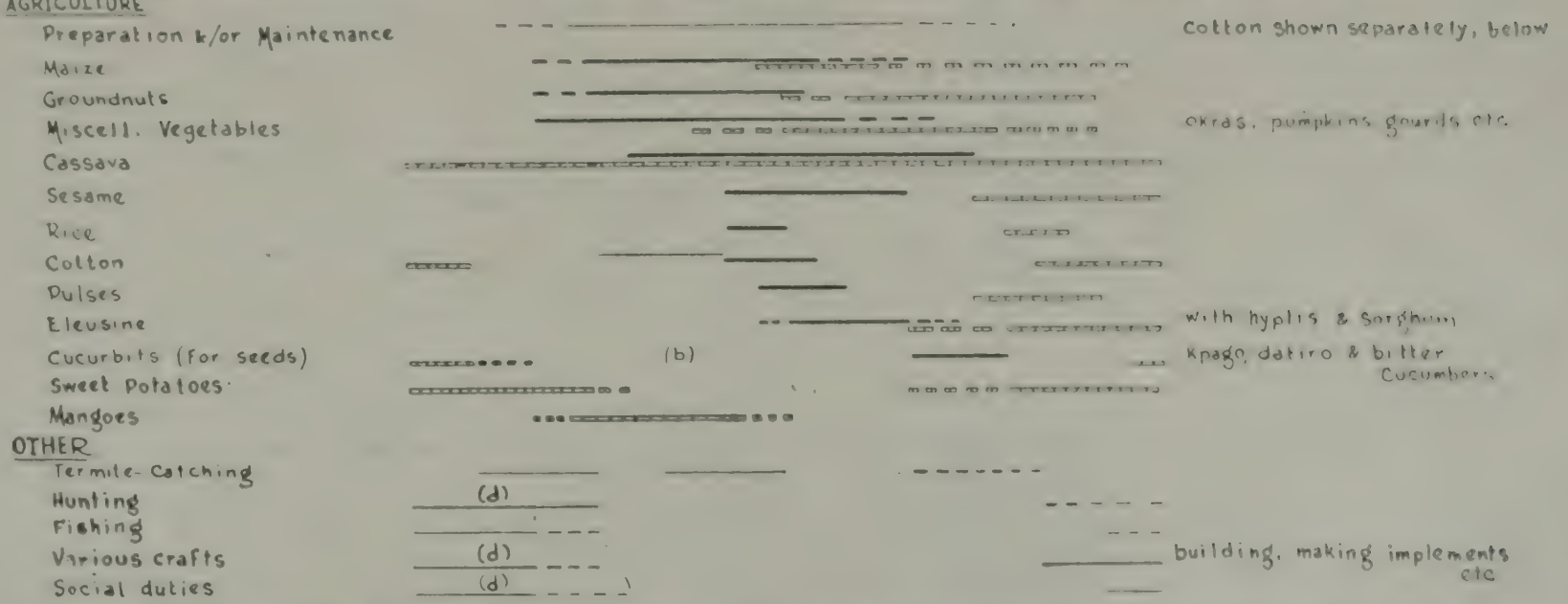
(*g*) B vitamins—assumed group value ; no direct data.

(*h*) Mineral values assume methods of preparation render some bones edible.

For further notes See Appendix IV

Fig a THE ZANDE YEAR (a)

KEY Planting — Harvesting ····· Other Work



NOTES. (a) Composite picture within which Local Variations occur In particular, some of the planting periods start too early for Tambura Sub-District and finish too late for Yambio Sub-District.

(b) Conflicting information about early crop

(c) Once established, carry over from year to year.

(d) And sporadically through year.

Fig b. THE BALANDA YEAR

KEY: Planting —— Harvesting —— Other work ——

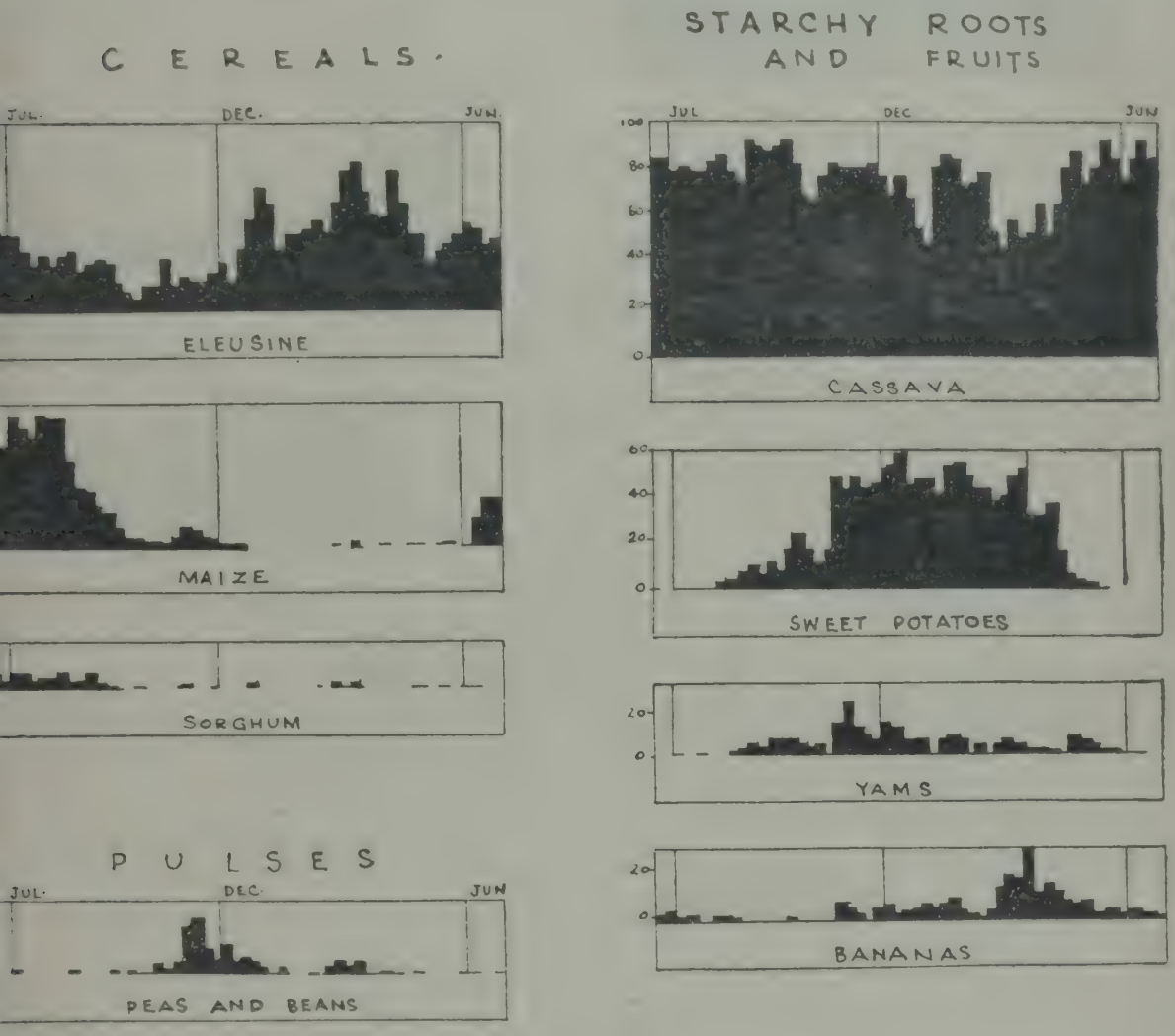
ACTIVITIES	JAN. FEB. MAR. APR. MAY JUN JUL. AUG. SEP. OCT. NOV. DEC	REMARKS
AGRICULTURE		
Preparation &/or Maintenance	——	
Guarding Crops		
Sorghum	—— ——	
Maize	—— ——	
Miscell Vegetables	—— ——	
Groundnuts	—— ——	okras, rosella, cucurbits etc.
Cassava	—— ——	
Sesame	—— ——	
Pulses	—— ——	
Eleusine	—— ——	
Sweet Potatoes	—— —— (a)	with hyptis & bulrush millet
Mangoes	—— ——	
OTHER		
Termite-Catching	—— no further data	
Hunting	(b) —— ——	
Fishing	—— ——	
Various crafts	—— —— no data (b)	
Social duties	(b) ——	Chiefly dry season

NOTES: (a) Not seen. Said to be no carry over from year to year as in zande country
(b) And sporadically through year.

FIG. C.

BA[a] FREQUENCY OF USE OF VARIOUS FOODS ROUGHOUT THE YEAR

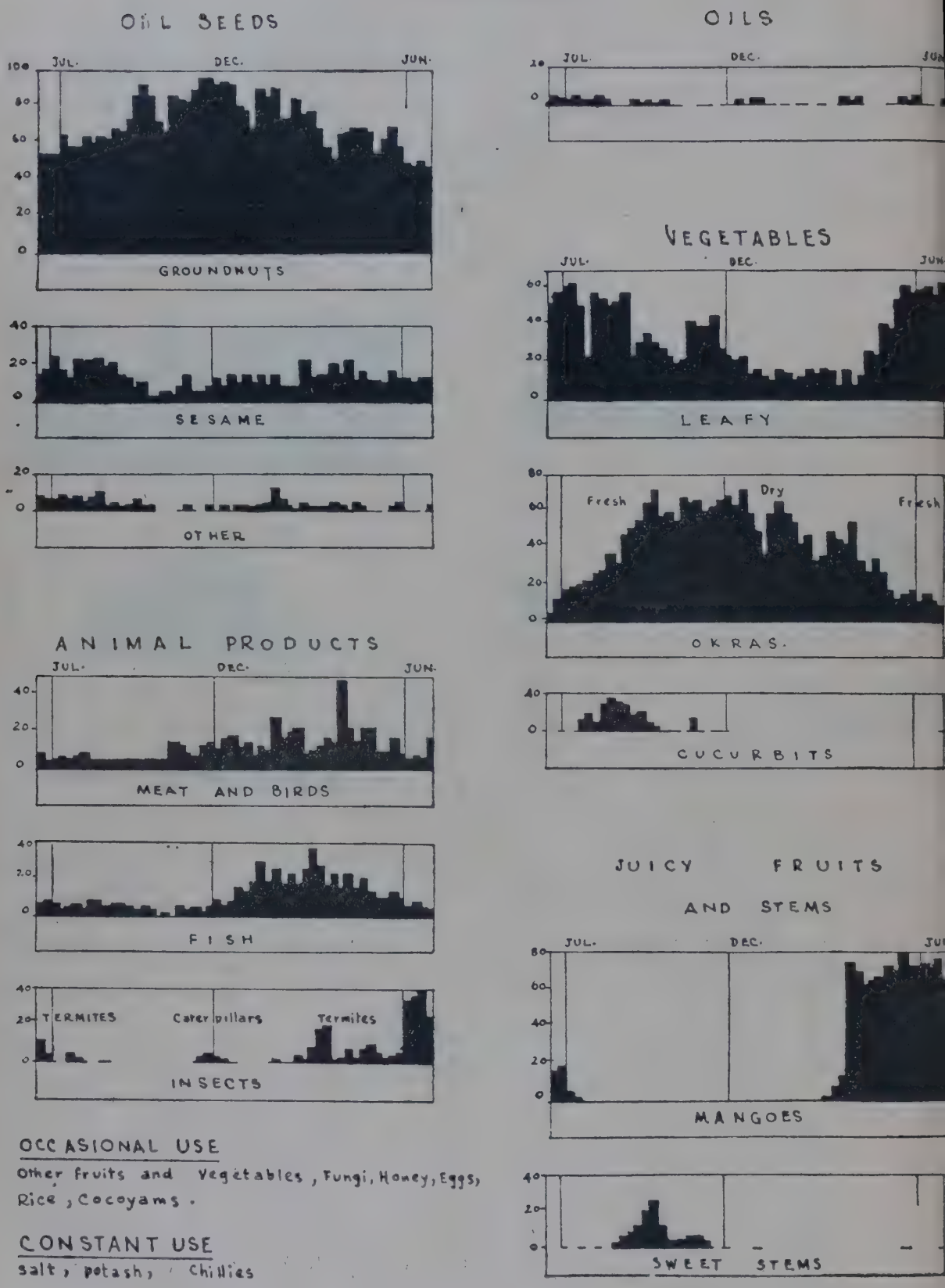
(As percentage of house/days per week)[b]



(a) Modified peasant, not resettled.

(b) Average number of house/days per week = 5·43.

FIG. C (continued)



OCCASIONAL USE

Other fruits and Vegetables, Fungi, Honey, Eggs, Rice, Cocoyams.

CONSTANT USE

salt, potash, Chillies

DISTRIBUTION OF CALORIES

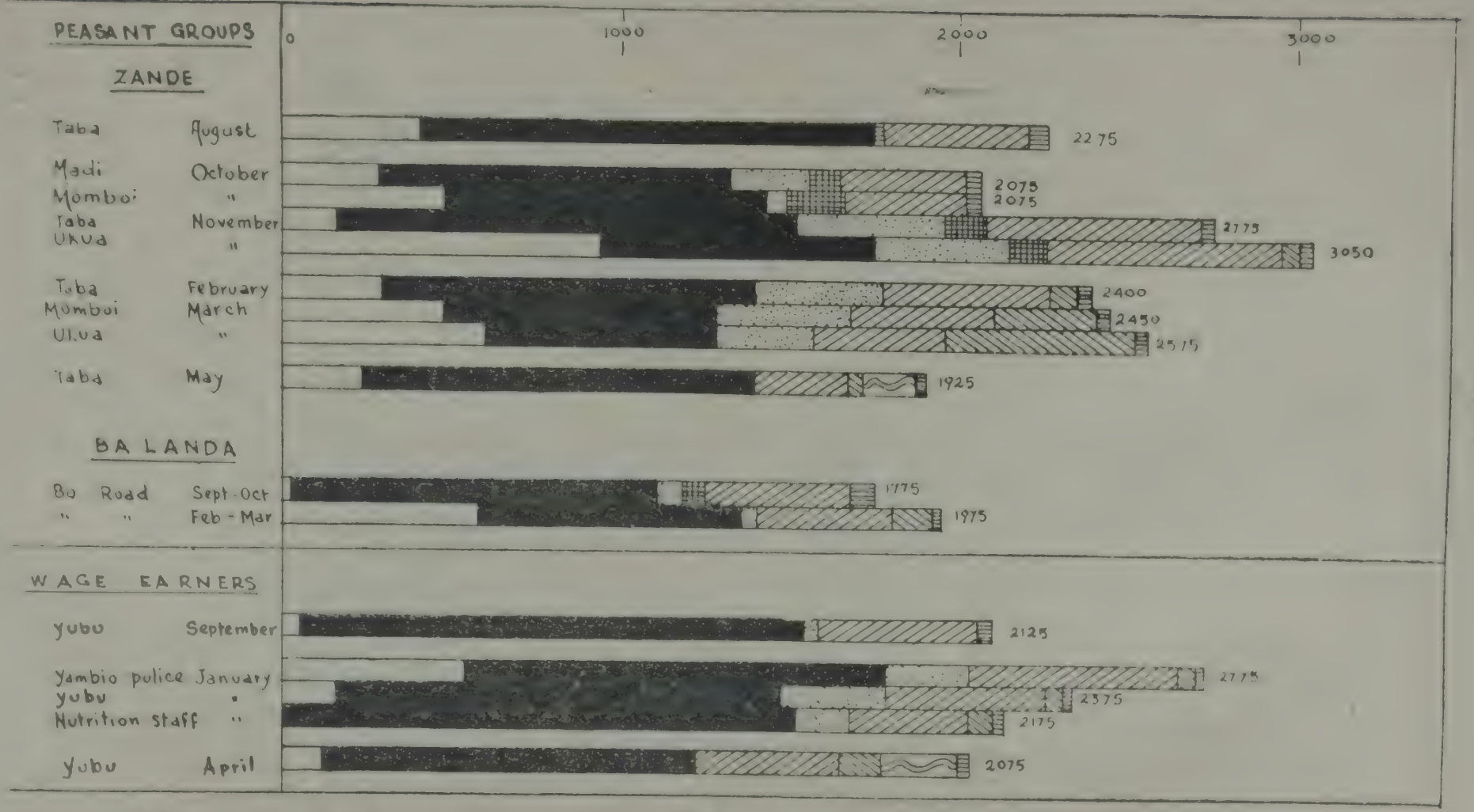


FIG. e.

DISTRIBUTION OF PROTEIN AND FAT

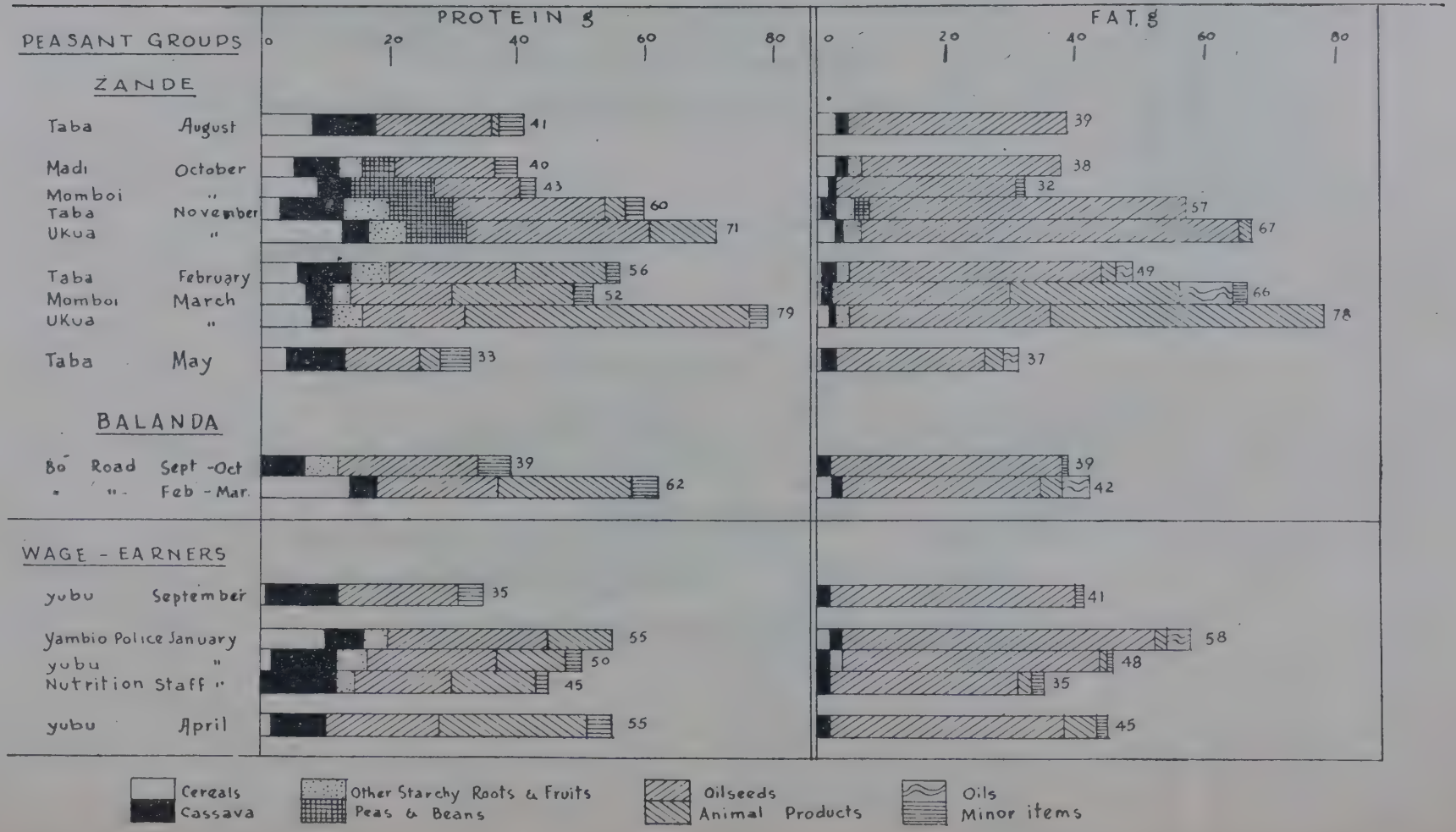
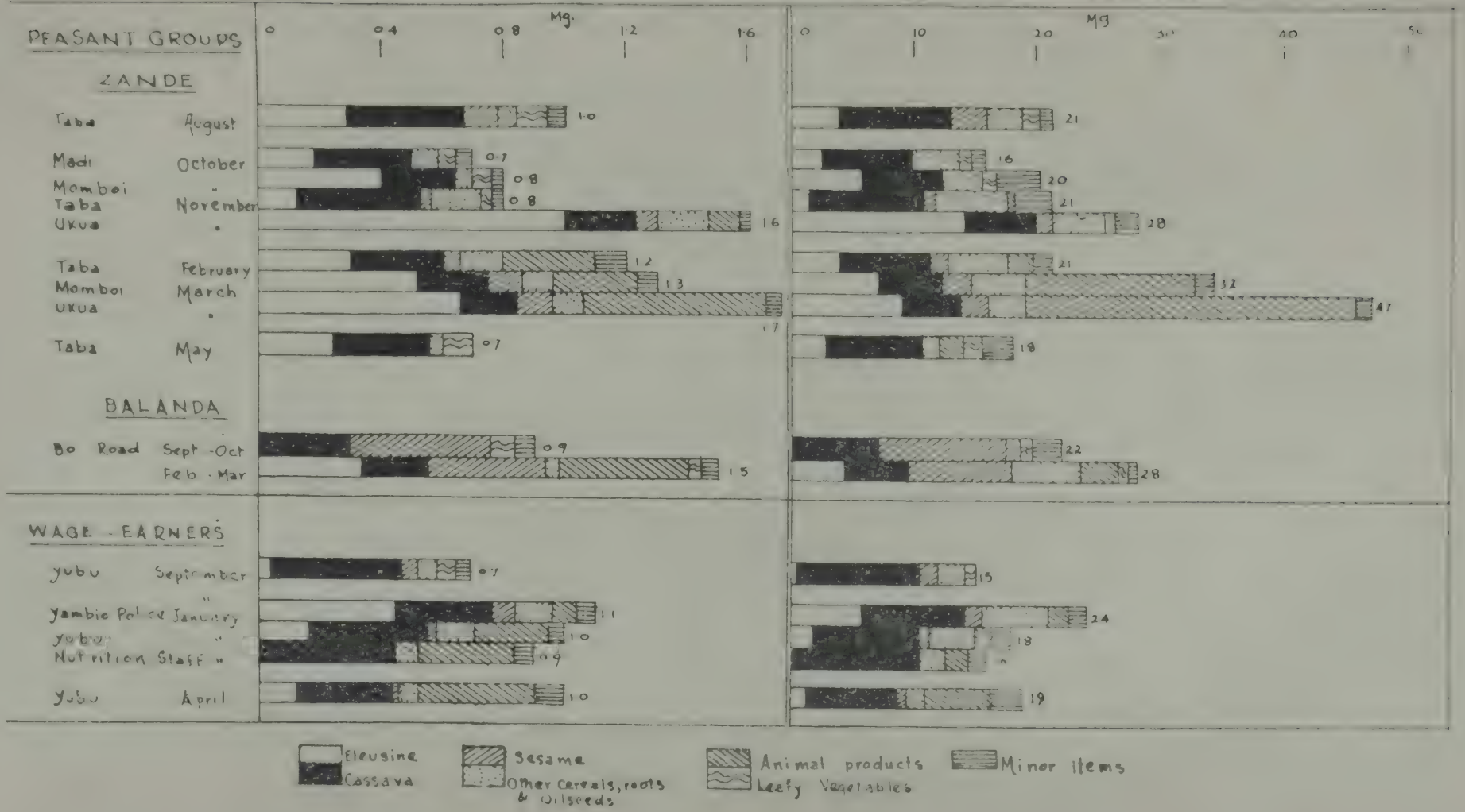


FIG. F

DISTRIBUTION OF CALCIUM AND IRON



DISTRIBUTION OF ANEURIN (VITAMIN B_1)

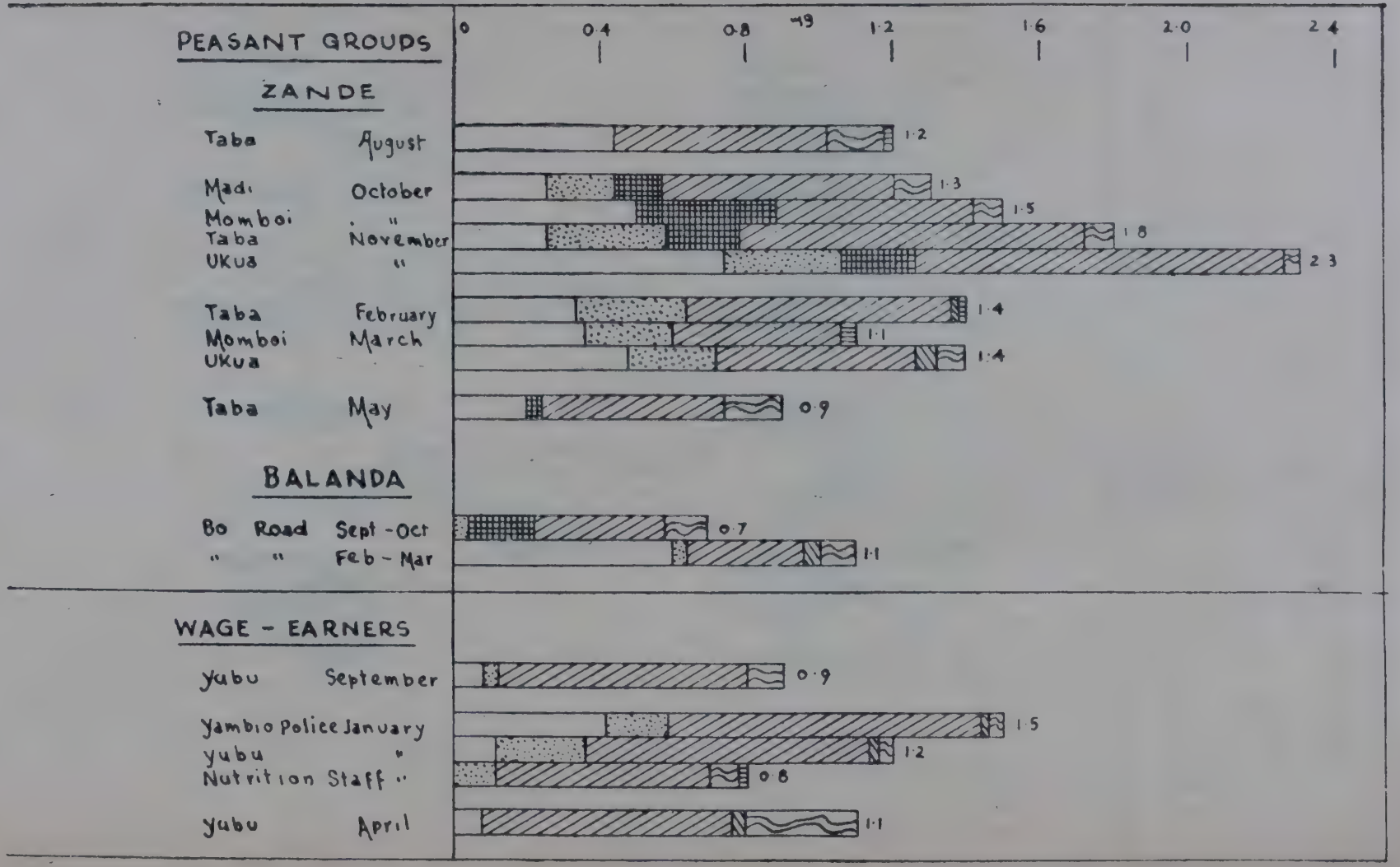


FIG 4

DISTRIBUTION OF RIBOFLAVIN AND NICOTINIC ACID

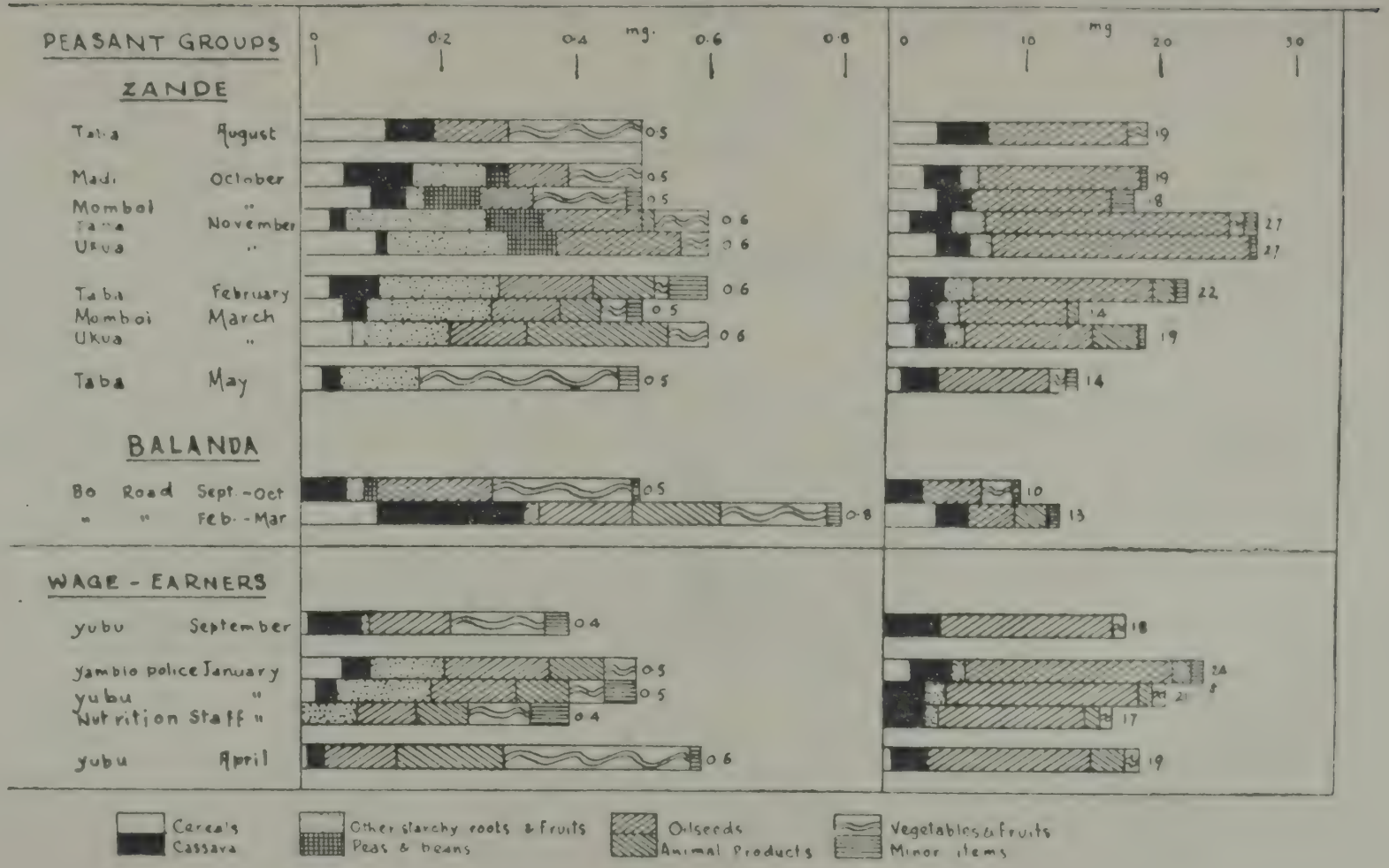
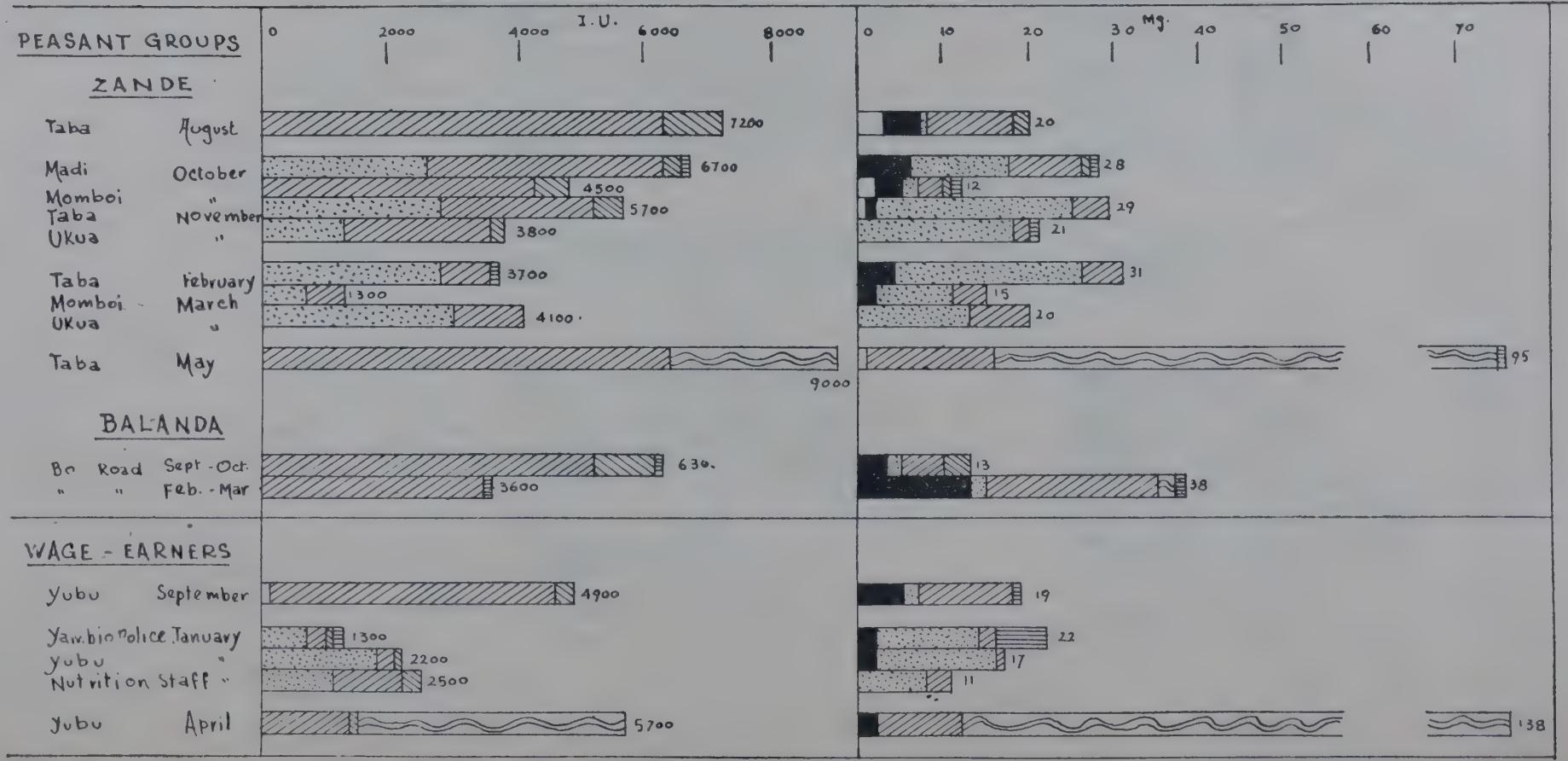


FIG. 1

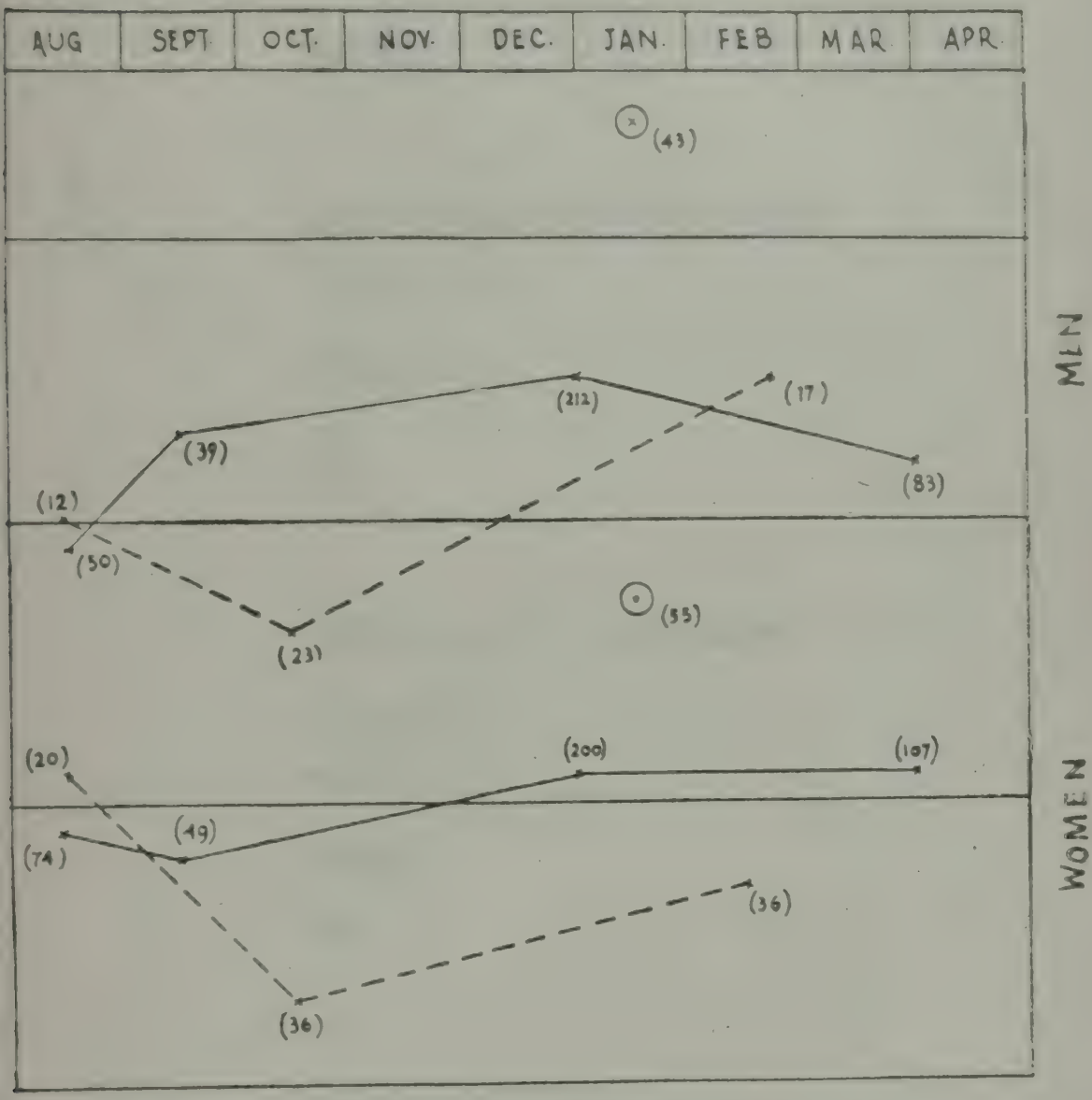
DISTRIBUTION OF VITAMIN A[(a)] AND ASCORBIC ACID (VITAMIN C)[(b)]



(a) As carotene. (b) Nett. For raw values, see table 21-25.

FIG. j

ADULT WEIGHTS FOR A GIVEN HEIGHT



ZANDE

BALANDA

POLICE (MEN)

POLICE (WOMEN)

Bracketed Figures — number in sample

HEIGHTS

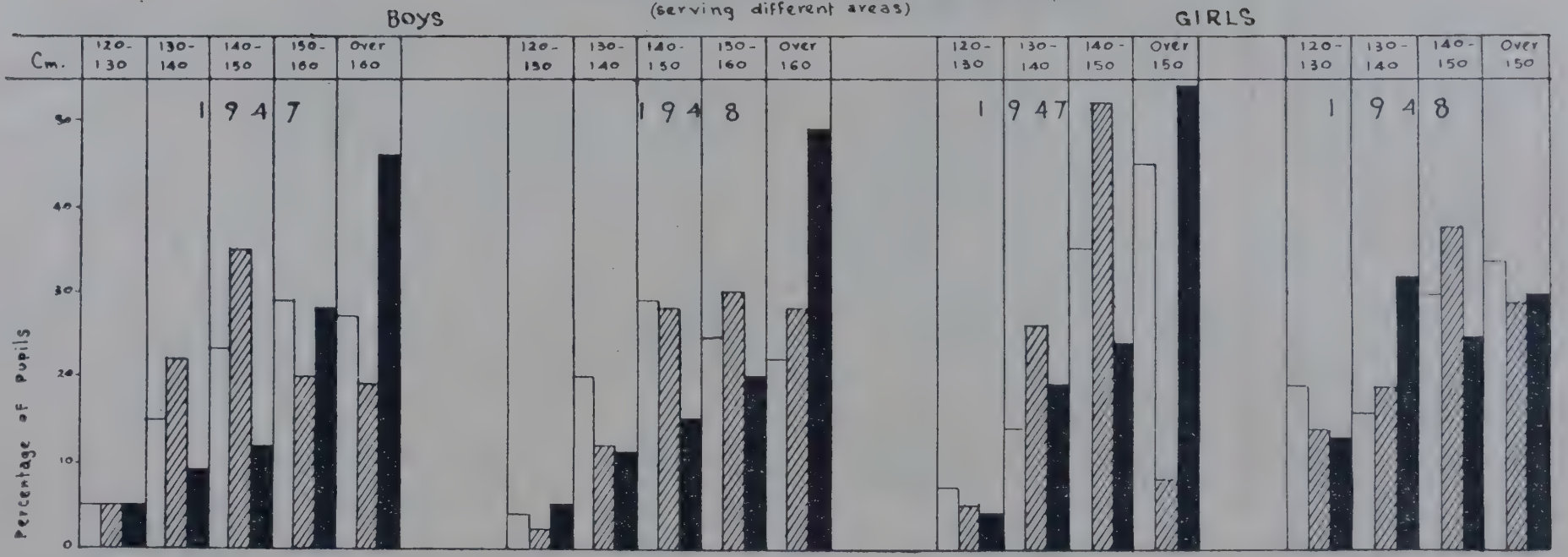
MEN 167.5cm.

WOMEN 157.5cm.

FIG. K.

HEIGHT DISTRIBUTION IN SCHOOLS

(serving different areas)



NUMBERS

MUPOI	222	147	88	56
YUBU	141	164	84	73
YAMBIO	162	168	54	47

MUPOI YUBU YAMBIO

FIG. 1

CHILDREN : WEIGHT FOR HEIGHT AT DIFFERENT SEASONS

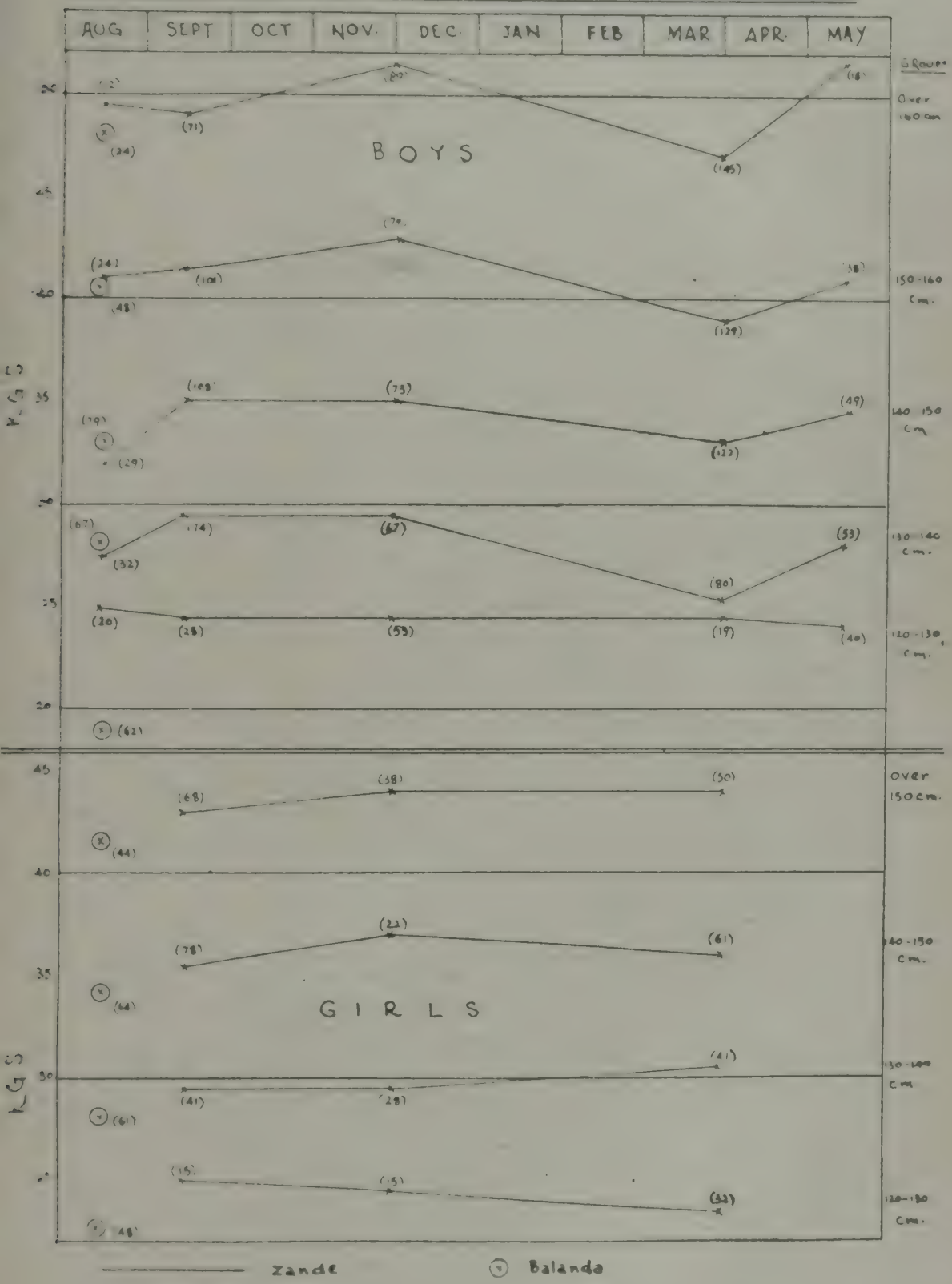
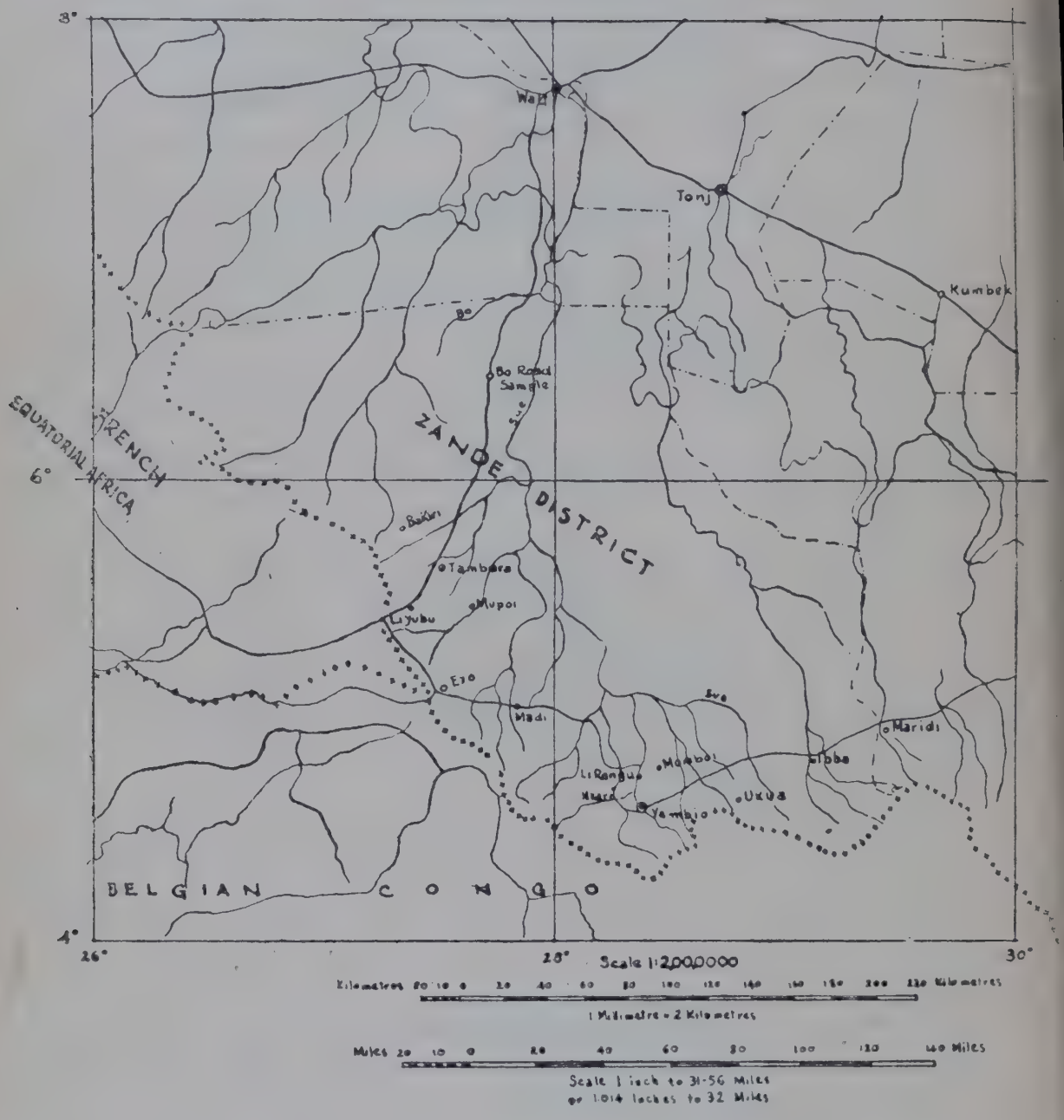


Fig. M. Map


3°
Wau
Tonj
Kumbek
Bo
Bo Road Sample
ZANDE DISTRICT
FRENCH EQUATORIAL AFRICA
6°
Baiki
Tambura
Mupoi
Ljubu
Ezo
Madi
Yei
Maridi
Mvolo
Li Rangua
Yambio
Ukua
Nzara
Tore
BELGIAN C O N G O
4°
26°
28°
30°
Scale 1:2,000,000
Kilometres 60 40 20 0 20 40 60 80 100 120 140 160 180 200 220 Kilometres
1 Millimetre = 2 Kilometres
Miles 20 10 0 20 40 60 80 100 120 140 Miles
Scale 1 inch to 31·56 Miles
or 1·014 inches to 32 Miles

A SURVEY OF SIGNS OF NUTRITIONAL ILL-HEALTH AMONG THE ZANDE OF THE SOUTHERN SUDAN

by

P. H. Abbott, M.B., B. Chir.,

Sudan Medical Service.

INTRODUCTION

It has long been appreciated that the nutrition of most tribes in the Southern Sudan leaves much to be desired, but the extent and severity of nutritional deficiencies is unknown, though periodic famines over wide areas at certain times of the year occur for all to see.

The Azande[1] are probably the best nourished tribesmen in the two southern Provinces. Their country enjoys a rainfall higher than elsewhere (an average of 1438 mm. at Yambio over ten years). The land is for the most part fertile, and famine conditions are never seen. Some of the older men, it is true, can remember famines and bad years, but the introduction a long time ago of manioc as a famine crop has provided a source of food which never fails. The country is well wooded, with numerous permanent streams, and many of these, particularly in the western part of the area, bear narrow fringes of Gallery Forest. Game, at one time believed to be plentiful, is now relatively scarce, and the prevalence of the tsetse-fly prevents the keeping of cattle except in Government stations.

The Azande were chosen as the subjects of the first detailed dietary survey in the Sudan because of a far-sighted Development Scheme upon which the Government has embarked. Briefly, the scheme is concerned with the development of the internal economy of the tribe, based on the growing, spinning and weaving of cotton, the production of oils, soap, etc., to a point where it can support a higher standard of social, educational and medical services. A knowledge of the nutritional background of the people is of the utmost value in determining future policy, and indeed in ensuring the welfare of the native workers in the industries of the scheme itself.

Mrs. G. M. Culwick came to the area in June 1947, and for just over a year she was busily engaged in collecting qualitative and quantitative data on the diet of the people. The clinical survey which forms the subject of this report is complementary to her more detailed and arduous work, for in the words of Platt (1947)

" . . . a satisfactory measure of its [the nutrition problem's] nature and dimensions can only be obtained from surveys for evidences of nutritional ill-health, preferably combined with a study of food consumption, of food supplies, and of various factors likely to affect the food economy."

---

(1) Sing. Zande Plur. *A*zande.

THE METHOD OF SURVEY

Every month all the members of one of the Chiefships in the area are inspected for cases of sleeping sickness. One or two sub-chiefships are gathered together in one place and the neck glands of each subject are palpated. The absent rate is seldom more than 4% and is usually less. At such inspections during the months of October 1947 to April 1948 persons were taken at random and examined for signs of nutritional ill-health. Persons were taken in each of five groups, but apart from this, and the exclusion of those with frank and obvious disease such as leprosy, there was no selection, and it is fair to assume that the samples were representative of the chiefships as a whole. In addition to surveys at these inspections, boys and girls at the Church Missionary Society School and families of the Police at Yambio were examined.

The groups chosen were as follows :—

Group I :	Boys aged c.4—16 years ;
Group II :	Girls aged c.4—16 years ;
Group III :	Adult Men ;
Group IV :	Adult Women ;
Group V :	Pregnant women and nursing mothers.

Group I, II and V, the young and the maternal, were taken as being most likely to show signs of nutritional ill-health owing to the strains imposed by growth and maternity.

The Chiefships, the number in the samples, and the months in which they were examined, were as follows :—

Chief Zungumbia	October 1947	
	February 1948	96
Chief Sangba	November 1947 ...	155
Chief Ukua	December 1947	69
Chief Gangura	January 1948	107
C.M.S. School	December 1947	
	April 1948.....	108
Police families	February 1948	68
	TOTAL ..	603

Persons for examination were examined systematically for the signs chosen, whilst a clerk noted them down. Boys and men were clad only in shorts, usually of bark-cloth, whilst the majority of the girls and women wore only a bunch of leaves fore and aft. No attempt was made to examine the scrotum or genitals as this would certainly have made the people uncooperative.

DESCRIPTION OF THE SIGNS

One of the difficulties in a survey of this kind lies in the appreciation of the signs themselves. The observer in his figures, states categorically that a certain sign is present or is not, whereas in many conditions there is a gradual transition from the normal on the one hand to the grossly abnormal on the other, and the point at which the normal ends and the abnormal begins is vague and ill-defined. Trowell (1948) emphasises this point.

It follows that if a survey is to have any value for comparison with other such surveys, the worker must carefully describe the signs he is recording and the point at which they are considered by him to be positive. This I now do.

HAIR : Dry, Staring

The Zande normally has short tight black curls. The single case showing this sign had hair in which the curl was almost absent, and the hair lay in straggly dry wisps.

Hypochromotrichia

There is a type of Zande whose skin is paler than that of his fellows and whose hair is reddish-brown instead of black. This distinction appears to be hereditary ; he is born like this and remains so throughout life. Probably less than one in 500 is of this type and none were included in this survey.

In the earliest stage of this physical sign, a change from the normal black to a reddish-brown colour is noticed in the short hair above the temples where the normal hair-line recedes on each side of the brow. In some cases, only the tips showed the change in colour, in others the whole shaft of the hair. In an advanced stage, the hair of the whole head is of the reddish-brown colour, and wherever it is seen the hair appears drier and with less curl than usual. This change is undoubtdly reversible, in contrast to the "red" Zande described previously, and was seen chiefly among children.

CONJUNCTIVAE : Thickened ; Grade I & II

If the eyelids of one showing this sign be parted with the finger and thumb, the triangular area of conjunctiva which lies on each side of the cornea and which is normally exposed when the eye is open, is found to be thickened in contrast to the conjunctival surface which is normally covered by the lids. It is usually of a yellower colour, with irregular swollen areas, and it is often irregularly pigmented.

Where this thickning and irregularity covered the whole of the orbital conjunctiva, both on the exposed and the normally covered surfaces, it was considered as Grade II. It is probable that many or even most of these Grade II cases would have been classed by other workers as *Xeropthalmia*. (Thus Adamson, Platt et al. 1945, and Passmore 1947.)

BITOT'S SPOTS

Glistening white plaques, adherent to the tops of irregularities on the thickened conjunctiva and probably composed of dead epithelium, form an unmistakeable physical sign.

CIRCUMCORNEAL INJECTION

Only a very definite and obvious dilatation of the blood vessels surrounding the cornea would have been considered as a positive sign under this heading and none was seen, though a degree of increased vascularity of the conjunctivae as a whole was not uncommon.

BLEPHARITIS

Generalised chronic inflammation of the eyelids was not seen.

FOLLICULOSIS

Acne-like lesions seen particularly on the forehead and cheeks; sometimes with visible *soft* sebaceous accumulations. (Platt. 1945.)

DYSSEBACIA

A sign which is definite. Whitish-yellow filiform plugs of sebaceous material stand out in plain contrast with the surrounding black skin and are not wiped away by a firm brush with the finger. The condition is usually seen on chin and cheeks but may involve the forehead, the skin at the base of the neck and that over the sternum. The area involved varied considerably, but where even a small patch of skin showed the change the sign was marked as positive. An excellent photograph of the condition was given by Platt (1945).

ANGULAR STOMATITIS

Loss of elasticity at the angles of the mouth with the appearance of inflamed cracks and soreness.

CHEILOSIS

Sore red lips with a thin, glazed, wrinkled epithelium without elasticity.

TONGUE; Swollen

Marks on the side and front of the tongue due to indentations of the teeth have been described as diagnostic of the swollen tongue. It was observed in this series that these indentations may occur when the tongue is clearly not swollen, due perhaps to an abnormally wide tongue in a small mouth. Persons considered to be showing this sign were those in whom the tongue appeared thickened as well as indented.

Papillae Hypertrophic

Figure 20, in "Medical Survey of Newfoundland" (Adamson, Platt et al. 1945), shows the condition to perfection. Enlarged papillas stand out a deep red in contrast to the paler surrounding surface. In some cases only the tip of the tongue is involved and these too were considered to be positive.

Papillae Atrophic

A smooth glistening surface, usually on a thin atrophic tongue.

Fissured

Cracks of varying depth, usually longitudinal and usually found on a small red tongue. In general such a tongue was not sore.

Magenta coloured

A difficult sign. Only if the colour was of a *deep* purplish-red was the sign considered positive, doubtful colours being ignored.

CLINICAL ANAEMIA

This was estimated by observation of the tongue and mucus membranes. To check the accuracy of such observations, haemoglobin estimations of 12 persons who had been placed in this category were

done by both the Sahli and Tallqvist methods. By the Sahli technique all showed figures of 83% (11.62 gm. per 100 ml.) or less; 9 showed figures of 80% (11.2 gm. per 100 ml.) or less, and 5 less than 74% (10.36 gm. Hb. per 100 ml.) The Tallqvist method, as has been experienced previously, gave results which showed no correlation with either Sahli or clinical estimations.

From these figures it is concluded that those marked as positive under this heading had less than 11.7 grammes of haemoglobin per 100 ml. and most considerably less, though some cases of anaemia were probably missed.

GUMS : Swollen

Noted particularly in the interdental papillae.

GUMS : Bleed easily

The upper lip was pressed against the gums and rubbed from side to side. If bleeding occurred the sign was present, though clearly the stimulus was slight.

Gingivitis

A definite inflammation of the gum margins.

CARIOUS TEETH

A dental probe was not used and minor degrees must therefore have been missed.

"PERMANENT GOOSEFLESH"

FOLLICULAR KERATOSIS

The name of the former sign accurately describes the appearance. The condition was found particularly over the hips and above the elbows in women. In the former site it appears to be connected with the constant rubbing of the skin by the baby which is usually carried at the side. The condition is also found commonly just above the knees, and about the base of the neck in men.

Trowell (1948) considers that Permanent Gooseflesh is but an early stage of Follicular Keratosis, the latter term being kept for those cases where the prominent follicles have become more keratinised and are not only to be seen but to be felt. With this my observations agree, but it seems that whereas "Permanent Gooseflesh" does not always occur only in those parts subject to trauma, Follicular Keratosis requires exposure and a degree of trauma for its formation. In this series it was seen only on the extensor surface above the elbows, on the thighs, and occasionally above the hip, but never at the base of the neck. There was never any doubt as to the presence or absence of "Permanent Gooseflesh," but the change to Follicular Keratosis was indefinite and only advanced changes were considered under the latter heading.

CRACKLED SKIN

Dry Skin : Grade I

It was exceedingly difficult to decide firstly whether the skin of the legs was drier than normal, and secondly whether the change to

Crackled Skin had occurred. The condition showed a gradual transition from the soft suppleness of normal skin to the dry cracked, desquamating surface of the well-established condition.

If there appeared to be less elasticity than expected in the surface layer of the skin below the knee and particularly over the tibial surface, Dry Skin Grade I was diagnosed. If the change had proceeded to fine reticulation and cracking of the surface with fine desquamation at the edges of the cracks, " Crackled Skin " was noted as present. Those with " Crackled Skin " were automatically marked as having Dry Skin Grade I as well.

Dry Skin: Grade II

This heading included those with dry skin not only on the legs but over the body as well. The severe changes described as CRAZY-PAVEMENT DERMATOSIS were not seen in this survey, though some cases have been observed in hospital practice.

ULCERS AND ULCER SCARS

The lower part of the legs of the Azande are, not infrequently, marked with pigmented scars of various shapes and sizes. Many are the result of septic abrasions, others of developed ulcers. In this series only those who had an active tropical ulcer, or who showed scars which had definitely deformed the contour of the skin, thus giving evidence of previous deep ulceration and healing with fibrosis, were noted as positive under the heading. The use of these criteria excluded those who had previously suffered from only shallow sores.

SYMPTOMS

No attempt was made to assess the prevalence of symptoms which might be attributable to nutritional ill-health. " Listlessness, lack of enterprise and interestedness," which Passmore (1947) notes as important evidence of early malnutrition, are certainly seen by all those who employ labourers, but how far these characteristics are due to poor nutrition and how far to other factors such as endemic diseases, it is impossible to say.

THE PREVALENCE OF THE SIGNS

The accompanying table shows the numbers in each of the five groups who showed the signs which have been described.

It will be observed that for some of the signs less than the total number in the group has been considered. This is explained by the fact that, in the early part of the survey, only some of the signs were registered, the rest being neglected. In such cases, the number in the group in whom the sign was specifically looked for, is indicated by the letter beside the number in the table (A, B, etc.).

NUTRITION SURVEY OF THE AZANDE, 1947

PREVALENCE OF THE SIGNS

	Group I	Group II	Group III	Group IV	Group V	TOTAL	
	Boys	Girls	Men	Women	Specl.	No.	%
Number in Group	185	154	92	122	50	603	100%
IR, Dry, Staring.....	1	0	0	0	0	1	0.17%
Hypochromotrichia	21	26	1	3	3	54	9.0%
NJUNCTIVAE, Thickened							
Grade I.....	75 +	29A	41B	66C	15D	226E	61.9%
Grade II	3 +	4A	27B	16C	4D	54E	15.0%
Bitot's spots	1 +	0A	0B	0C	0D	1E	0.27%
ircumcorneal injection .	0 +	0A	0B	0C	0D	0E	0.0%
ES : Blepharitis	0 +	0A	0B	0C	0D	0E	0.0%
CE : Folliculosis	15 +	14A	13B	14C	9D	65E	17.8%
Dyssebacia	16F	2A	49B	44C	6D	117G	33.6%
Angular stomatitis	1	0	1	0	1	3	0.5%
Cheilosis	1	0	0	0	0	1	0.17%
NGUE : Swollen	2	3	12	14	4	35	5.8%
Papillae hypertrophic ...	136	110	26	64	29	365	60.8%
Papillae Atrophic	8	2	7	5	0	22	3.7%
Tongue fissured.....	4	5	5	2	0	16	2.7%
Tongue Magenta coloured	1 +	0A	1B	0C	0D	2E	0.55%
INICAL ANAEMIA....	21 +	19A	8B	34C	7D	89E	24.4%
MS : Swollen	17 +	8A	10B	17C	3D	55E	15.3%
Bleed easily	3 +	3A	1B	3C	0D	10E	2.7%
Gingivitis	21	16	55	45	22	159	26.5%
ETH : Carious	15	12	19	37	12	95	15.8%
IN :							
Permanent Gooseflesh ..	49	50	39	38	18	194	32.3%
Follicular Keratosis	2	5	4	9	2	22	3.7%
" Crackled Skin "	93	64	5	31	15	208	34.7%
RY SKIN : Grade I (Legs)	75 +	59A	46B	56C	16D	252E	69.0%
Grade II (Body & Legs)	11 +	1A	2B	11C	0D	25E	6.9%
LCERS and Ulcer scars .	42	27	18	26	14	127	21.1%

+ T°tal examined	110	" C " Total examined	88	" F " Total examined	93
" A " " "	75	" D " " "	23	" G " " "	348
" B " " "	69	" E " " "	365		

THE SIGNIFICANCE OF THE SIGNS

Before going on to the interpretation of these physical signs in terms of possible nutritional deficiencies, it is as well to review shortly the endemic diseases of the area, their prevalence, and the possible roles they may play in producing the appearances described.

Filariasis due to *F. loa* and to *A. parstans* is exceedingly common. *Onchocerciasis* is relatively rare except in certain localities where it is common. The former two parasites are thought by some to cause changes in the skin similar to, if not identical with, those described, whilst *Onchocerca volvulus* certainly does so. In areas where this parasite is prevalent, dryness, thickening and follicular keratosis are common, though the parasite may often be found in skin which shows no such changes.

Bilharziasis due to *B. mansoni* and *Ankylostomiasis* due to *A. duodenale* are found in more than 25% of persons and undoubtedly play a part in the causation of anaemia. On the whole the Azande are resistant to these parasites, and symptoms are rarely as severe as are found in other tribes.

Malaria due mainly to *P. falciparum* is hyperendemic and causes noticeable anaemia particularly in infants.

Syphilis is widespread, though yaws is unknown.

Leprosy occurs in just over 5% of the inhabitants. It may give rise to areas of skin showing typical " Permanent Gooseflesh." These occur in well defined patches, usually small and often over the back. In some advanced cases atrophy of the skin over the entire body occurs with thinning, dryness and loss of elasticity; in others " Crazy Pavement " dermatosis may be observed.

Such a high incidence of leprosy may in itself be an indication of nutritional ill-health in a community.

How far the effects of these diseases are due to the direct action of the parasites, and how far they are due to interference with absorption or utilisation of nutriments, is not at present known, and it would seem dangerous to try to apply nutritional standards, worked out for healthy persons—usually Europeans—to subjects in each of whom there are literally so many mouths to feed! Nevertheless, until more knowledge of the part played by parasites, climate, and racial differences is acquired, there seems to be no alternative method to give useful results.

With some appreciation of the prevalence of disease, we can now pass to a consideration of the signs and their possible causes in terms of nutritional poverty.

Hypochromotrichia

Trowell and Mukazi (1945) note a failure to gain weight, some softness and brownness of the hair, and pallor of the facial skin, as the earliest signs of " Malignant Malnutrition," the cause of which is unknown. I have never yet seen the full syndrome of this serious condition among the Azande, nor is pallor of the skin observed in conjunction with the colour change in the hair except in the hereditary type of " Red " Zande.

Platt (1946) classes the sign among those usually regarded as due to Vitamin B_2 deficiency or to lack of certain amino-acids.

Trowell (1948) observes that signs in the hair cannot be ascribed to a deficiency of any individual vitamin.

The condition among the Azande is undoubtedly reversible, and it would seem probable that it is due to the lack of some necessary substance in the diet.

Conjunctival Changes

Trowell (1948) and Adamson, Platt et al. (1945) consider these changes as probably due to avitaminosis A, though Platt (1946) states:—

> "I am impressed with the association found between the incidence of Vitamin B_2 (and or protein) deficiency, such as these skin changes, and conjunctival changes grouped under 'Excess Tissue, grades 1, 2 and 3'."

In this series also, the association is well-marked.

One cannot help feeling that in some degree the heat and glare of a tropical climate combined, in the dry season, with irritating dust, must account for changes in the exposed portions of the conjunctivae. This is borne out by the observation that the changes are most frequently observed in the adult groups and are least common in young girls, but if this were the whole truth it is difficult to see why adults can be found who do *not* show the change.

Skin Changes

Folliculosis
Dyssebacia
Crackled Skin
" Permanent Gooseflesh "
Dry Skin, Grade I and II

Platt (1946) states that it is usual to regard these changes (among others) as features of Vitamin B_2 deficiency but he adds:—

> "There is, however, reason to think that some confusion exists in experimental work between the effects of B_2 vitamins and those of certain amino-acids, and it may be that *some* of the effects ascribed to shortage of B_2 vitamins will ultimately be found to be due to a shortage of certain essential amino-acids."

He goes on to note his impression that these changes are associated with conjunctival changes in the passage quoted above.

In his paper of 1946, he draws attention to the work of Smith, Smith & Callaway (1941), who produced evidence that dyssebacia does not respond to treatment with known members of the B_2 complex, but is cured by administration of autoclaved yeast or liver extract.

Follicular Keratosis Platt (1946) considers separately from the above skin changes, and observes that with Bitot's spots the sign is generally regarded as evidence of Vitamin A deficiency. He noted in 1945, however, that Crandon, Lund and Dill (1940) had shown "quite conclusively that a 'follicular keratosis' can be produced in man on a Vitamin C deficient diet containing adequate amounts of vitamin A."

Trowell (1948) considers follicular keratosis to be the ultimate stage of a change which starts as "permanent gooseflesh," and groups them both under the heading of those signs commonly ascribed to a deficiency of vitamin A.

It is clear therefore that there is no general agreement as to the significance of these signs.

I am of the opinion that Dry Skin, Grade I, and the lesser degrees of Crackled Skin, are, in a great many cases, merely the result of the climate and the habits of the native. Hot, dry weather, sitting about or working in the dust all day, and, in the evenings, warming the legs beside a fire, must all be conducive to drying of the skin, and absence of washing allows the dry surface layers to remain undisturbed. After long dry treks I have observed on my own legs a drying of the skin which I would have classed as a positive sign under the heading, and on some occasions I have seen minor degrees of crackled skin over my shins, though the change has not remained for long.

I would agree that severe degrees of the latter condition are a manifestation of nutritional disorder, but the dividing line between the normal and the pathological is so indistinct and depends so much on the observer, that the sign is virtually useless as an indication of nutritional ill-health in comparative nutritional surveys. The signs of Dyssebacia, " Permanent Gooseflesh " and Folliculosis, are much more satisfactory in that the deviations from the normal appearance are distinct.

SIGNS IN THE TONGUE

Hypertrophied papillae were seen in over 60% of persons examined, whereas the other changes were uncommon. Adamson, Platt et al. (1945), who reproduce a photograph which shows exactly the condition found in the series, state :—

> " A less severe chronic deficiency of Niacin causes hypertrophy of papillae of the tongue followed by multiple fissuring and papillary atrophy."

If all the cases seen were indeed due to Niacin deficiency, it is surprising that later stages of the change were not seen more frequently. A possible explanation would be that during the dry season, when this study was made, a significant deficiency of the vitamin occurs, but is relieved by the more varied diet in the rains. The studies on the food habits of the Azande should throw light on this point.

Adult men suffered the least ; an observation which may be explained by their greater consumption of native beer.

ANAEMIA

It is most noticeable that severe anaemias which, in many other tribes, result from Bilharzia and Hookworm infections, are rare among the Azande. Nevertheless, mild and moderate degrees of anaemia are common and must result from an unsatisfactory balance between blood loss and destruction and the intake or absorption of factors necessary for its regeneration. The type of anaemia was not studied in this investigation, but hospital experience points to the microcytic, hypochromic variety as being the most common. The incidence was highest in adult women and in those pregnant or suckling babies.

CHANGES IN THE GUMS

Swollen gums were seen in 16% and gingivitis in 26%. Bleeding gums were noted in less than 2%, but the trauma applied was minimal.

Adamson, Platt et al. (1945), consider that these changes can be caused by a low intake of ascorbic acid. They report that in a recent study in Canada "there is evidence to show that many of the acute and subacute gingival signs are the result of an increased liability to infection." They could be caused to disappear by local treatment, but with a low intake of ascorbic acid recurrences were more frequent than in those with an adequate intake.

Trowell (1948) considers the evidence to be conflicting.

Observations on the dietary intake of this vitamin during the dry season may suggest whether the signs noted are of significance in this respect.

TROPICAL ULCERS AND SCARS

The cause of this common condition has never been satisfactorily explained. Though many workers have published papers giving evidence to incriminate single substances, their claims have not been substantiated. It is clear that there are a number of aetiological factors at work and it is safe to assume that one or more of them is nutritional. A high incidence of tropical ulcer may provide evidence of nutritional ill-health in a community, but further than this we cannot at present, go.

SUMMARY AND CONCLUSIONS

This clinical survey has shown that signs commonly ascribed to nutritional ill-health are exceedingly prevalent among the Azande.

It is clear from the literature that opinions as to the significance of the various signs are by no means unanimous in ascribing them to particular deficiencies, though there appears to be general agreement that most of the signs are, in fact, due to ill health which could be alleviated by improvements in the diet.

It would probably also be agreed, at least by the London school of thought, that those signs most frequently seen among the Azande are indicative of a diet which is lacking in a sufficiency of vitamin B complex and or certain amino-acids, though few would, at present, be willing to narrow the field further than this.

Mrs. Culwick's report on the dietary intake of the Azande will indicate what ingredients are lacking by comparison with accepted standards, though, as I have pointed out, standards acceptable for European communities may not apply to African tribes. Indeed it seems almost certain that different tribes would react differently to any given diet just as they show different reactions to the same disease and to the same medicine. (Cf. the results of ankylostomiasis and of injections of bismuth in Dinka and Azande respectively.) Knowledge of African "standards" can only be acquired by surveys in which both the dietary intake and the clinical signs of ill health are evaluated and correlated, and it is important for purposes of comparison that the latter be carefully described. Moreover, due cognisance must be taken of the parasites which the African supports, and any estimate of his "standard" needs, where this is to be applied to primitive areas, would do well to include provision for them.

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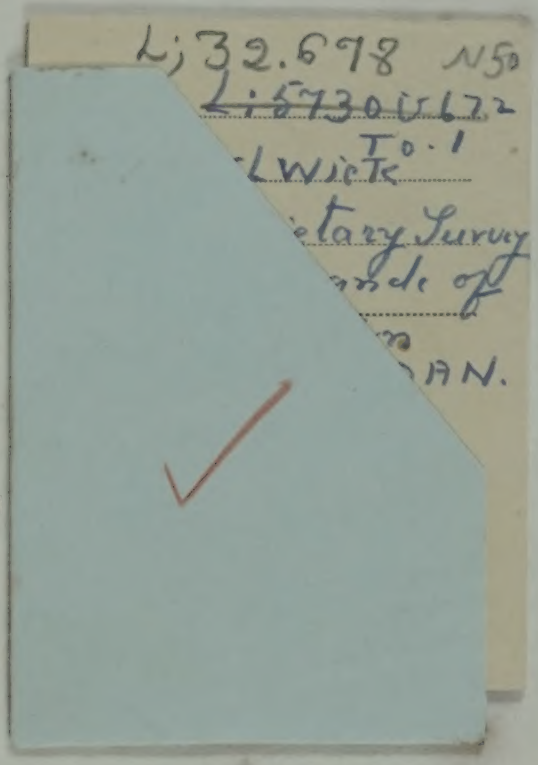
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